BCIS CURRICULUM STRUCTURE, 2013

Foundation Courses   (30 Credit Hours)

ENG	101	English I	3
ENG	102	English II	3
MTH	103	Mathematics I	3
MTH	104	Mathematics II	3
STT	101	Business Statistics	3
STT	201	Data Analysis and Modeling	3
ECO	101	Introductory Microeconomics	3
ECO	201	Introductory Macroeconomics	3
SOC	101	Fundamentals of Sociology	3
PSY	101	General Psychology	3

Management Core Courses   (30 Credit Hours)

ACC	121	Financial Accounting I	3
FIN	133	Fundamentals of Financial Management	3
LAW	291	Legal Aspects of Business and Technology	3
MGT	241	Principles of Management	3
MGT	211	Fundamentals of Organizational Behavior	3
MGT	311	Fundamentals of Operations Management	3
MGT	314	Management of Human Resources	3
MGT	412	Strategic Management	3
MKT	241	Principles of Marketing	3
RCH	311	Business Research Methods	3

CIS Core Courses   (51 Credit Hours)

CMP	161	Programming Language	3
CMP	162	Digital System	3
CMP	163	Object Oriented Language (JAVA)	3
CMP	261	System Analysis and Design	3
CMP	262	Database Management System	3
CMP	263	Computer Architecture and Microprocessors	3
CMP	264	Numerical Methods	3
CMP	265	Internet Technology (Web Programming)	3
CMP	361	Operating Systems	3
CMP	362	Data Communication and Networks	3
CMP	363	Advance Programming (JAVA)	3
CMP	365	Electronic Commerce (Programming)	3
CMP	366	Computer Graphics and Image Processing	3
CMP	367	Data Structure and Algorithms	3
CMP	461	Information System Security	3

| CMP | 462 | IT Project Management | 3 |
| CMP | 464 | Digital Economy | 3 |

Electives
(Any two of the following courses) **(6 Credit Hours)**
CMP	471	Dot Net Technology	3
CMP	472	Routing and Switching	3
CMP	473	System Administration on Windows and Linux	3
CMP	474	Mobile and Wireless Communication System	3
CMP	475	Cloud Computing	3
CMP	476	Distributed Database Management System	3
CMP	477	Management of Technology	3
CMP	478	Geographical Information System	3
CMP	479	Mobile Computing (Programming)	3

Project Work and Internship **(10 Credit Hours)**

PRJ	291	Minor Project I	1
PRJ	391	Minor Project II	2
PRJ	493	Project Work	4
INT	393	Internship	3

Pokhara University
BCIS Program
CURRICULAR STRUCTURE AND COURSE CYCLE

Semester I			Semester II		
Course Code	**Course Description**	**Credit Hours**	**Course Code**	**Course Description**	**Credit Hours**
ENG 101	English I	3	ENG 102	English II	3
MTH 103	Mathematics I	3	MTH 104	Mathematics II	3
PSY 101	General Psychology	3	ECO 201	Introductory Macroeconomics	3
ECO 101	Introductory Microeconomics	3	CMP 162	Digital Systems	3
MGT 111	Principles of Management	3	CMP 163	Object Oriented Language (Java)	3
CMP 161	Programming Language	3			
		18			**15**

Semester III			Semester IV		
Course Code	**Course Description**	**Credit Hours**	**Course Code**	**Course Description**	**Credit Hours**
STT 101	Business Statistics	3	STT 201	Data Analysis and Modeling	3
CMP 264	Numerical Methods	3	ACC 121	Financial Accounting I	3
CMP 261	System Analysis and Design	3	CMP 262	Database Management System	3
SOC 101	Fundamentals of Sociology	3	MGT 211	Fundamentals of Organizational Behavior	3
CMP 263	Computer Architecture and Microprocessor	3	CMP 265	Internet Technology (Web Programming)	3
			PRJ 291	Minor Project I	1
		15			**16**

Semester V			Semester VI		
Course Code	**Course Description**	**Credit Hours**	**Course Code**	**Course Description**	**Credit Hours**
FIN 133	Fundamentals of Financial Management	3	RCH 311	Business Research Methods	3
CMP 361	Operating Systems	3	MGT 311	Fundamentals of Operations Management	3
CMP 362	Data Communications and Networks	3	CMP 365	Electronic Commerce (Programming)	3
MKT 241	Principles of Marketing	3	CMP 366	Computer Graphics and Image Processing	3
CMP 363	Advance Programming (JAVA)	3	CMP 367	Data Structure and Algorithms	3
			PRJ 391	Minor Project II	2
		15			**17**

Semester VII			Semester VIII		
Course Code	**Course Description**	**Credit Hours**	**Course Code**	**Course Description**	**Credit Hours**
			MGT 412	Strategic Management	3
CMP 461	Information System Security	3	CMP 464	Digital Economy	3
CMP 462	IT Project Management	3	PRJ 493	Major Project	4
MGT 314	Management of Human Resources	3	LAW 291	Legal Aspects of Business and Technology	3
INT 393	Internship	3		Elective II	3
	Elective I	3			
		15			**16**

FIN 133 Fundamentals of Financial Management
BCIS, 5th Semester

Course Objectives
The aim of this course is to impart the fundamental knowledge of financial management to the students and enhance their analytical knowledge and skills in financial management of related industry through industry specific cases.

Course Description
This course is designed focusing the students who study only one semester course of financial management, and therefore it covers only the fundamental aspects of financial management. This course introduces financial concepts and principles, and explains how they apply to specific operations in non-financial service sectors such as hospitals, hotels, IT and travel businesses. This course covers introduction to financial management environment, financial statements and analysis of service industry, risk and return, time value of money, raising capital, cost of capital, capital budgeting, capital structure and leverage, dividend policy and working capital management.

Course Outcomes
By the end of this course, students should be able to:
- understand the basics of financial management, forms of organization of non-financial service industry and structure of financial markets and institutions;
- understand and analyze the financial statements of service industry using the key financial ratios;
- raise funds from the financial markets;
- apply the concept of time value of money to work out the value of different types of cash flows;
- calculate the component and composite cost of capital;
- apply the different techniques of capital budgeting to select the projects;
- understand basic aspects of capital structure and leverage; and
- explain dividend decision policies; and
- discuss the concepts and components working capital, and calculate the working capital cash flow cycle.

Course Contents

Unit I: Financial Management and Its Environment   6 hours
Nature of financial management; Finance functions; Role of the financial manager; financial goals; Forms of organizations; and an overview of financial institutions and markets.

Unit II: Financial Statements and Analysis   6 hours
Understanding financial statements: Income statement, Cash flow statement and balance sheet; Common size balance sheet; Ratio analysis: Short-term solvency measures, Long-term solvency

measures, Asset management measures, Profitability measures, Market value measures, The DuPont identity; Use and limitation of financial ratios.

Unit III: Time Value of Money   6 hours
Concept of time value of money; Present values and discounting; Future values and compounding; Annuities and perpetuities; Effective interest rate and average percentage return; Application of time value of money in hospitality industry.

Unit IV: Raising Capital   7 hours
Short-term versus long-term capital; Term loan; Bonds: meaning, types, Bond innovation; Preferred stock; Common stock: equity account in balance sheet, Rights and privileges of common stockholders; Cost and benefit of debt versus equity; Methods of selling securities; Initial public offerings; Concept and functions of investment bankers; Concept of venture capital; and concept of lease financing.

Unit V: Cost of Capital   4 hours
Concept of cost of capital; Component cost of capital: Debt, Preferred stock, Common stock, Retained earnings; Weighted average cost of capital, Application of cost of capital in financial decision making in hospitality industry.

Unit VI: Capital Budgeting   6 hours
Concept of capital budgeting; Types of projects; Capital budgeting techniques – payback period, NPV, IRR, Comparison of NPV with IRR, and profitability index; and application of capital budgeting techniques.

Unit VII: Capital Structure   4 hours
Concept of capital structure and financial structure; Setting target capital structure; Factors affecting capital structure; Business risk and financial risk; Operating and financial leverage.

Unit VIII: Dividend Decision   4 hours
Concept of dividend; Cash dividend versus stock dividend; Dividend payment process; Stock dividend and stock split.

Unit IX: Working Capital Management   5 hours
Concepts and components of working capital; Importance of working capital management; Types of working; Factors affecting working capital; and working capital flow cycle.

Basic Texts
> Ross, S. A., Westerfield, R. W., & Jordan, B. D. *Fundamentals of corporate finance*. New Delhi: Tata McGraw-Hill.

References
1. Gapenski, L. C. *Healthcare finance: an introduction to accounting and financial management*. Chicago: Health Administration Press.

2. Andrew, W. *Financial management for hospitality industry.* USA: American Hotel and Lodging Association (AHLA).
3. Iyengar, A. *Hotel finance.* New Delhi: Oxford University Press.
4. Brigham, E. F., & Houston, J. F. *Fundamentals of financial management.* Singapore: Thomson South-Western.
5. Pradhan, R. S. et al. *Fundamentals of financial management.* Kathmandu: Buddha Education Publishers.
6. Manandhar, K. D. et al. *Fundamentals of financial management.* Kathmandu: Khanal Publication.
7. Paudel, R. B., Baral, K. J., Gautam, R. R., & Rana, S. B. *Financial management.* Kathmandu: Asmita Books Publishers and Distributors.

CMP 361 Operating Systems
BCIS, 5th Semester

Course Objectives
The main objective of the course is to provide students with an understanding of fundamental concepts of operating systems.
Other objectives are to make students understand:
- the services provided by and the design of an operating system
- the structure and organization of the file system
- what a process is and how processes are synchronized and scheduled
- different approaches to memory management

The course also aims to familiarize students to understand system calls for managing processes, memory and the file system management.

Course Description
The students will become familiar with the basics of operating systems and the feature controlling of modern operating system. The course helps in providing general understanding of structure of modern computers, purpose, structure and functions of operating systems with illustration of key OS aspects by examples.

Course Outcomes
By the end of the course you should be able to
- describe the general architecture of computers;
- describe, contrast and compare differing structures for operating systems; and
- understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.

Course Contents

Unit I: Introduction   5 hours
OS concepts (brief history), Importance and functions of OS, Concepts of Uniprogramming, Multiprogramming, and Parallel Programming, Evolution of OS, Types of OS: Sequential, Batch, Multiprogramming (multitasking), Multiprocessing (multiprocessor), Time Sharing, Real Time, Distributed, Embedded, Kernel, OS architectures (structures): Monolithic, Microkernel, Layered, Client-server, Virtual machine, Operating System services: System calls, Shell commands, Shell programming, OS Examples: DOS, UNIX, Linux, MS-Windows, Handheld OS etc

Unit II: Process and Thread Management   6 hours
Introduction to Process: Process description, Process states, Process Control Block (PCB), Threads, Process vs Threads, Scheduler and its types: Short term, Medium term and Long term, Scheduling and its types: preemptive and non-preemptive, Process Scheduling algorithms: FCFS, SJF, SRTF, RR, Priority, HRN, Multi-level, Multi-level Feedback, Thread Scheduling, Multiprocessor scheduling concepts

Unit III: Inter Process Communication and Synchronization   6 hours
Introduction to IPC, Process Communication Mechanisms: Message Passing, Remote Procedure Call (RPC), Shared Resource (Memory), Resource sharing, Concurrent process, Critical region, Race condition, Solution of race condition: Mutual exclusion, Mutual exclusion algorithms: Locks, Test and Set Lock (TSL), Peterson's algorithms, Semaphore, and Mutex, Monitor, Process Synchronization
Classical problems of Process Synchronization: Readers-Writers Problem, Producer-Consumer Problem, Sleeping Barber Problem, Dining Philosopher Problems

Unit IV: Deadlock   5 hours
Process Deadlock, Reusable, Consumable Resources, Causes (Conditions) of Deadlock: Mutual Exclusion, Hold and Wait, No Preemption, and Circular Wait, Deadlock Handling, Prevention, Avoidance: Ostrich Algorithm, Bankler's Algorithm, Detection, Recovery, Others issues: Database deadlock, Communication deadlock, Livelock, Starvation

Unit V: Memory Management   7 hours
Concepts of memory and its hierarchy, Memory address: Logical and Physical address, Concept of swapping, Managing Free Memory Space: First Fit, Best Fit, Next Fit, and Worst Fit, Coalescing and Compaction, Memory Management Techniques, Contigious: Resident Monitor, Multiprogramming with fixed and variable partition, Non-Contigious: Paging, Segmentation, Paging with segmentation, Demand Paging, Virtual Memory Management, Page Replacement Algorithms: FIFO, NRU, LRU, Clock, Optimal, Thrashing

Unit VI: Input/Output Management and Disk Scheduling   5 hours
I/O Devices, I/O Techniques: Programmed I/O, Interrupt-driven I/O, and Direct Memory Access (DMA), Principle I/O hardware: I/O devices, Device controllers, DMA, I/O software: Polling, Interrupt, I/O software layer, Disk, Formatting, Arm scheduling algorithms: FCFS, SSTF, Elevator (Scan), C-Scan, Look, C-Look

Unit VII: File System Management   4 hours
File Naming, File Organization and access, File Directories and paths, File Sharing, Record Blocking, File system implementation: Contigious, linked-list, linked list with table, I-nodes, Secondary File Storage Management, Examples: CD ROM file system, MS DOS file system, Unix file system

Unit VIII: Security   4 hours
Security issues, Types of attacks, Security policy and Access control, Basics of cryptography: Encryption and Decryption, Protection mechanisms, Authentication, OS design considerations for security

Unit IX: Distributed Operating System   6 hours
Introduction to distributed system and distributed operating system, Goals and objectives, Distributed operating system (DOS) vs Network operating system (NOS), DOS as middleware, Communication in distributed system: client-server, RPC, and group communication, Mutual exclusion, Clock synchronization algorithm, Election algorithm

Lab Works
Different lab works related to normal OS and distributed OS in Windows, and Linux OS.

Basic Texts
1. William, S. *Operating Systems*. Delhi: Pearson Education.
2. Tanenbaum, A. S. *Modern Operating Systems*. New Delhi: Prentice Hall of India.

References
1. Milenkovic, Milan. *Operating Systems Concepts and Design*. New Delhi: Tata McGraw Hill.
2. Silbcrschatz A, G. P., & Gagne, G. *Operating System Concepts*. New York: John Wiley and Sons.
3. Bach, M. J. *The Design of The Unix Operating System*. New Delhi: Prentice Hall of India.
4. Crowley, C. *Operating Systems: A Design-oriented Approach*. New Delhi: Tata McGraw Hill.

CMP 362 Data Communications and Networks
BCIS, 5th Semester

Course Objectives
This course aims to provide the study of computer systems, data communications and computer networks. The course includes different kinds of networking topologies and their structure and design. This course also covers the telecommunication system, electronic email, data flows, networking protocols, and organization around ISO-OSI seven-layer architecture, with review of each layer.

Course Description
This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network, models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols. The course is supplemented by practical components.

Course Outcomes
After completing this course the student must demonstrate the knowledge and ability to:
- independently understand basic computer network technology;
- understand and explain data communications system and its components;
- identify different types of network topologies and protocols;
- enumerate the layers of the OSI model and TCP/IP, explain the function(s) of each layer;
- identify different types of network devices and their functions within a network;
- understand and building the skills of sub-netting and routing mechanisms; and
- familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Contents

Unit I: Data Communication Fundamental   5 hours
Introduction, Block diagram, Data components, Simplex, Duplex, Half Duplex, Signal: Analog and Digital Modulation and its types, Multiplexing and its types, Data representation: Line coding, Transmissions impairments

Unit II: Introduction to Computer Network   5 hours
Definition, Uses of network, Types of networking: LAN, WAN, MAN, Extra-Net, Intra-Net, Inter-Net, Networking Model: Client-Server, Peer-to-peer model, Active model, Protocols and Standards, Connection-Oriented and Connectionless Protocol, OSI Reference Model and TCP/IP Model, Comparison of OSI and TCP/IP Model, Example network: X.25, Frame Relay, NGN and MPLS

Unit III: Physical Layer and its Design issues 6 hours

Introduction, design issues and duties of physical layer, Transmission media: Guided: Twisted Pair, Coaxial, Fiber optic. Unguided: Electromagnetic spectrum, Line of Sight, Satellite, Wireless LAN IEEE 802.11 standards. Bandwidth and Data Rate, Switching: Circuit switching, Packet switching. Devices: Hub, Repeaters

Unit IV: Data Link Layer 6 hours

Services, Framing, Error Control: detection and Correction, Flow Control Elementary Data link protocol, Sliding Window Protocol, Go Back N, Selective Repeat. Example of Data Link Protocol: HDLC, PPP. The Medium Access Control Sub-layer, Multiple access protocol Devices: Switches, Bridges

Unit V: Network Layer 12 hours

Network layer and its Design issues, Devices: Routers, Gateway. Virtual Circuit and Datagrams Switching, Routing: Static vs. Dynamic, Routing algorithms: Shortest path algorithm, Flooding, Distance vector routing, Link state routing. Congestion Control algorithm: Leaky Bucket and Token Bucket. Internet Protocol: IPv4 frame format, IP Addresses and Classes, Subnetting and Subnet mask. Introduction to IPv6, frame format, addressing, transition from IPv4 to IPv6: Dual stack, Tunneling and Header Translation.

Unit VI: Transport Layer 3 hours

Services provided to upper layer, Transport protocols: TCP, UDP, SCTP, Ports and Sockets

Unit VII: Application Layer 3 hours

DHCP, DNS, HTTP, SMTP, PROXY, FTP, Example of Clients and Servers Tools

Unit VIII: Network Management and Network Security 6 hours

Network Management: Introduction, Components & Internet Management Framework.
Network Security: Introduction, Goals. Attacks and countermeasures: Mapping, Packet sniffing, spoofing, Denial-of-Service Attacks and Hijacking. Cryptography: Symmetric Key and Public Key. Network layer security: IPsec, VPN. Wireless LAN Security: WEP, WPA. Firewalls

Unit IX: Cloud Networking 2 hours

Introduction, concepts of cloud networking, Network virtualization

Laboratory
- Network cabling and LAN setup
- Computer Networking on Windows Based Platform (Commands and Tools use)
- Computer Networking on Unix Based Platform (Commands and Tools use)
- Installation and Configuration of Different Types of Servers
- User of Traffic Analyzer
- Implement Network Security and Policies

References

1. Forouzan, B. A. *Data Communication and Networking.* New Delhi: McGraw Hill Education.
2. Tanenbaum, A. S. *Computer Networks.* New Delhi: Prentice Hall of India.
3. Jenkins, N., & Schatt, S. *Understanding Local Area Networks.* New Delhi: Prentice Hall of India.
4. Stalling, W. *Data and Computer Communication,* New Jersey: Macmillan Press.
5. Kurose & Ross. *Computer Networking: A top down approach.* New Jersey: Pearson Education.

Course Objectives

This is the foundation course on marketing. It aims to build students' understanding of the marketing process and principles. Through this course, students also acquire skills to design marketing strategies of SMEs.

Course Description

This course focuses on operation of the marketing function in a dynamic and competitive environment. It deals comprehensively on issues of emerging marketing practices and challenges, the dynamics of the marketplace, and designing of marketing mix. The course includes topics that help students to understand marketing process and environment, information systems and buyer behavior, segmentation, targeting, and positioning strategies, and strategies related to marketing mix variables.

Course Outcomes

By the end of this course, students should be able to:
- describe the tasks of marketing management in the modern organizations;
- understand the development of the marketing philosophies and their relevance in the contemporary business world;
- identify the challenges faced by marketers in the 21st century;
- identify the micro and macro environmental forces that determine the success of marketing efforts;
- examine the role of marketing information system in designing marketing strategies;
- understand the buying process and influencing factors related to individual consumer and organizations;
- design basic strategies related to market segmentation, targeting, and product positioning;
- analyze the strategies related to marketing mix variables.

Course Contents

Unit I: Marketing and Marketing Environment   12 hours

Introduction to Marketing and Marketing Management: Meaning of marketing; Evolution of the Marketing philosophies (marketing concepts); Basic principles of the marketing concept and holistic marketing concept. Meaning and tasks of marketing management.

Marketing in the Contemporary World: Marketing challenges of the 21st century and firms' responses to the challenges; Concept, relevance and practices of relationship marketing, green marketing, e-marketing, pyramid (C2C) marketing and rural marketing.

Marketing Mix: Components of the marketing mix for products and services.

Marketing Environment: Meaning and scope of marketing environment; Micro environment variables, and Macro environment variables; Reactive and proactive marketing. Marketing environment in Nepal.

Unit II: Marketing Information System and Buyer Behavior   10 hours
Marketing Information System: Concept and relevance; Components of the marketing information system; Marketing research areas and process.

Buyer Behavior: Organizational buyer behavior – Buying process and influencing factors. Consumer behavior – buying process and influencing factors. Consumer movement and consumer protection.

Unit III: Segmentation, Targeting and Positioning Strategies   4 hours
Segmentation: Concept, process and requirements; levels of segmentation; bases for segmenting consumer and organizational markets.

Targeting: Segment evaluation, analysis and selection.

Positioning: Concept and types of positioning; product positioning process.

Unit IV: Product, Pricing, Distribution and Promotion Strategies   22 hours
Product: Concept and levels of the product; product classifications; Product life cycle stages and strategies; New product development process; Branding strategies – branding objectives, types of brand, and concept of brand equity; Packaging: functions and levels of packaging; essentials of a good package; Product line and mix strategies; Service product strategies: service marketing concept, characteristics of services and marketing strategies; management of people, physical evidences, and process.

Pricing: Concept of price and pricing; Importance of pricing; Internal and external price factors; Pricing approaches – cost-based, demand-based, value-based and competition-based approaches; New product pricing; price lining, price adjustments, initiating and responding to price changes.

Distribution: Concept and objectives; Channel functions; Channel designs for consumer and industrial products; Channel selection factors; Channel conflicts and their resolution. Marketing logistics: Concept, nature and objectives; major logistics functions – transportation, warehousing, inventory management, order processing, and customer services decisions.

Promotion: Concept; Marketing communication process and systems; promotion mix components; promotion mix determination factors. Advertising: Nature and objectives; Advertising budgeting approaches; Adverting message design factors; Advertising media selection factors. Personal Selling: Nature and relevance of personal selling; Types of personal selling. Sales Promotions: Nature and objectives; Sales promotion tools and techniques. Public Relations: Nature and objectives; tools of public relations. Direct marketing: Concept and relevance; Methods of direct marketing.

Basic Texts
1. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ehsan ul Haque. *Principles of Marketing: South Asian Perspective.* New Delhi: Prentice Hall of India.
2. Baines, Paul, Chris Fill and Kelly Page. *Essentials of Marketing.* New Delhi: Oxford University Press.

References
1. Koirala, K. D. *Principles of Marketing*: Kathmandu: Buddha Academic Publications.
2. Kamarulzaman, Yusniza and Nor Khalidah Abu. *Principles of Marketing*: New Delhi: Oxford University Press.

CMP 363 Advanced Programming (JAVA)
BCIS, 5ᵗʰ Semester

Course Objectives

This course aims to develop students with knowledge of advanced features of java for making familiar with desktop and web based application. Basic knowledge of programming in Java is expected from students. This course should be associated with laboratory experiments to augment the concepts taught in the class.

Course Description

Introducing the AWT, Using AWT controls, Layout Managers, and Menus, Event handling, Introducing Swing, Exploring Swing ,The Applet Class, JDBC, Introduction to J2EE, Servlet Programming, JSP Programming.

Course Outcomes

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

- develop a complete GUI (Graphic User Interface) based system;
- develop web based applications;
- orient themselves towards android based programming;
- develop, compile, and execute java programs using arrays and recursion;
- develop, compile, and execute java programs manipulating strings and text documents;
- develop, compile, execute java programs that include GUIs and event driven programming; and
- demonstrate a final project using applets for inclusion in web pages; applets to access enterprise data bases in robust.

Course Contents

Unit I: Introducing the AWT   **3 hours**
- AWT classes
- Window fundamentals
  - Component
  - Container
  - Panel
  - Window
  - Frame
- Working with frame Windows:
  - Setting the Windows dimensions
  - Setting a Windows title
  - Hiding and showing
  - Closing a Frame Windows

Unit II: Using AWT controls, Layout Managers, and Menus   **6 hours**
- AWT Control Fundaments

- Adding and removing controls
- Responding to controls
  - Labels, buttons, checkboxes, CheckboxGroup choice, lists, scroll bars, textfield, textarea,
- Understanding Layout managers
  - FlowLayout, BorderLayout, GridLayout, CardLayout, GridBadLayout
- Menus Bars and Menus, Dialog boxes, FileDialog boxes

Unit III: Event handling   **6 hours**
- Two event handling mechanisms
- The delegation event model
  - Events
  - Event sources
  - Event listeners
  - Event classes
    - ActionEvent class, Adjustment Event class, ContainerEvent class, FocusEvent class, ItemEvent class, MouseEvent class, KeyEvent class, TextEvent class, WindowEvent class
- Sources of Events
- Event Listener Interfaces
  - ActionListener, Adjustment Listener, Container Listener, FocusListener, ItemListener, MouseListener, WindowListener ,KeyListener, TextListener
- Using Delegation event model
- Handling mouse events
- Handling keyboard events
- Handling ActionEvent of all components
- Adapter classes, inner classes

Unit IV: Introducing Swing   **3 hours**
- The origins of swing, swing is built on the AWT
- Two Key Swing Features
- The MVC connection
- Components and containers

Unit V: Exploring Swing: **3 hours**
- JLabel and ImageIcon, JTextField, JButtons, JToggleButton, checkboxes, radio buttons, JTabbedPane, JList, JComboBox, JTable
- Two types of applets

Unit VI: The Applet Class   **4 hours**
- Applet basics
- The Applet class
- Applet Architecture
- An applet skeleton
- The HTML applet tag

- Passing parameters to applets

Unit VII: JDBC   **6 hours**
- Database Basics
- Structured Query Langauge
  - Creating a Table
  - Inserting Data
  - Updating records in table
  - Retrieving records from table
  - Deleting records
- Database Drivers
  - JDBC-ODBC bridge
  - Party Java Partly Native Driver
  - Intermediate Database Access Driver Server
- JDBC API
  - Creating a table
  - Inserting Data in table
  - Reading Data
  - Deleting Data
  - Prepared Statement

Unit VIII: Introduction to J2EE   **3 hours**
- Core J2EE Technologies
- Enterprise Application Architecture
  - 2-Tier Architecture
  - 3- Tier Architecture
  - N-Tier Architecture
  - Enterprise Architecture
- J2EE Application Servers

Unit IX: Servlet Programming   **7 hours**
- HTTP
  - GET Request
  - POST Request
- Server Side of the Web Application
- Web Container
  - Structure of a web application
- Servlet Technology
  - Servlet
- Deployment Descriptor
- Steps for writing a servlet
- Servlet initialization
- Reading HTML form data
- Session Management
  - Creating session

- o Storing data in session
- o Reading the data from session
- o Destroying the session
- Request dispatching
  - o The forward() method
  - o The include() method

Unit X: JSP programming   **7 hours**
- JSP Basics
  - o JSP Directives
  - o JSP Declarations
- Implicit Objects
- Java Beans in JSP
  - o jsp:useBEan
  - o jsp:setProperty
  - o jsp:getProperty

Basic Text
    Kosuri Phani, *Java & J2EE Made Easy*, North Carolina: Lulu Publications.

Reference
    Herbert Schildt, *Java the Complete Reference*, New Delhi: McGraw-Hill Education.

RCH 311 Business Research Methods
BCIS, 6th Semester

Course Objectives
The objective of this course is to provide students with the opportunity to learn the process of collecting, analyzing, and interpreting quantitative and qualitative data to aid managerial decision making. Students develop and practice the knowledge and skills necessary to review, apply and conduct organizational research.

Course Description
This course introduces students to a number of research methods useful for academic and professional investigations of information practices, texts and technologies. By examining the applications, strengths and major criticisms of methodologies drawn from both the qualitative and quantitative traditions, this course permits an understanding of the various decisions and steps involved in conducting research, as well as a critically informed assessment of published research. The emphasis of the course is therefore on problem definition, hypothesis formulation, research design, measurement, sampling, secondary data gathering, observation and interviews, and data analysis. Emphasis will also be placed on conducting and using research in an ethical manner.

Course Outcomes
At the conclusion of the course, students should be able to:
- describe the concept, process, significance, and value of scientific research;
- explain the nature of different types/methods used in management research;
- explain the research process in terms of problem statement, theoretical framework, research questions and hypothesis formulation;
- demonstrate understanding of research design: how research methodology is selected given a problem, how the data are analyzed and interpreted; how research is reported; and the implications of the findings to theory, research and practice;
- compare and contrast quantitative and qualitative research methods;
- demonstrate skill in using the library and internet resources to identify and synthesize research literature by writing a review of literature;
- demonstrate skill in describing and interpreting various statistical techniques using descriptive and inferential statistics;
- describe data collection and analysis techniques in qualitative research;
- prepare research proposals and communicate research results through writing acceptable reports which follow formatting requirements.

Course Contents

Unit I: Introduction to Research   8 hours
The meaning of research; the nature and types of research; application of scientific thinking in research, scientific research - scientific research process, characteristics of scientific research;

Emerging paradigms in research; quantitative and qualitative approaches to research; Business research – role, types and value for decision making; Ethical considerations in business research.

Unit II: Literature Review and Theoretical Framework   5 hours
Literature review - purpose and steps; searching, obtaining, and evaluating the literature, literature search through the Internet, format and guidelines for presenting the literature review; Theoretical framework – concept and format; Research and theory – deduction and induction.

Unit III: Problem Definition and Hypothesis Formulation   3 hours
Problem definition – concept and steps in problem formulation; Research questions; Hypothesis - functions and types; criteria of good hypothesis statement.

Unit IV: Research Design   10 hours
Definition; elements of a research design; Types of research design – exploratory; descriptive (developmental and case study); correlational; causal-comparative and experimental research designs; Qualitative research – concept, basic assumptions, features and design.

Unit V: Measurement, Scaling and Sampling   5 hours
Variables – concept and types; Measurement and scales, scale construction and attitude measurement; Scales and techniques commonly used in business research; Validity and reliability of measurement; Sampling – concept, probability and non-probability sampling; sampling and non-sampling errors.

Unit VI: Data Collection and Analysis   12 hours
Data and its types; sources of primary and secondary data; Questionnaire – principles, components and types – format and types; Research interviews – principles and types; Sources of qualitative data – observation, participant observation, focus groups; E-research using Internet and websites to collect data from individuals; web surveys, e-mail surveys; Getting data ready for analysis; Data processing; Presenting data in graphs and tables; Statistical analysis of data – descriptive and inferential statistics; Hypothesis testing; Methods of analyzing qualitative data.

Unit VII: Writing Proposals and Project Reports   5 hours
Project work – concept, purpose and methods; Research proposals – functions, types and components; features of research proposal; Research report – concept, process, types and procedure for writing research reports; conventions of academic writing; components of the project report; body of the project report; Documenting sources - APA style of citation and referencing; Essentials of good research report.

Basic Texts
1. Bryman, A., & Bell, E. *Business Research Methods*. New Delhi: Oxford University Press.
2. Zikmund, W. G. *Business Research Methods*. New Delhi: Thompson.

References

1. Cooper, D. R., & Schindler, P. S. *Business Research Methods*. New Delhi: Tata McGraw Hill.
2. Pant, P. R. *Business Research Methods*. Kathmandu: Buddha Academic Enterprises.
3. Flick, U. *An Introduction to Qualitative Research*. New Delhi: Sage South Asia Edition.
4. Sekaran, U. *Research Methods for Business: A Skill Building Approach.* New Delhi: Wiley India.

Course Objectives

The objective of this course is to introduce students to the field of Operations Management (OM). It will give a survey of the main OM issues and the key concepts and tools for dealing with them.

Course Description

This course provides an introduction to the concepts, principles, problems, and practices of operations management. Emphasis is on managerial processes for effective operations in both goods-producing and service-rendering organization. Topics include operations and productivity, operations strategy, forecasting, product and process design, quality assurance, location and layout strategies, supply chain management, inventory management, operations scheduling, JIT and lean operations. The topics are integrated using a systems model of the operations of an organization.

Course Outcomes

By the end of this course, students should be able to:
- Understand and appreciate the production and operations management functions in any organization;
- Understand the importance of productivity and competitiveness to organizations;
- Understand the various production and operations design decisions;
- Explain the importance of product and service design decisions and how they relate to the overall strategies of organizations;
- Explain the importance of quality management practices to attain organizational effectiveness;
- Describe the roles of inventories and basics of managing inventories in various demand settings;
- Analyze the contemporary operations and manufacturing organizational approaches and supply-chain management activities.

Course Contents

Unit I: Introductions to Operations Management
Operations and Productivity   **5 hours**
Introduction, organizing for transformation process, objectives, heritage of operations management, operations in service sector, Trends in operations management, productivity challenges, Ethics and social responsibility.
Operations Strategy   **5 hours**
Global view of operations, developing missions and strategies, achieving competitive advantages through operations, strategy development and implementation.

Unit II: Designing Operations

Product and Process Design   **7 hours**
Product selection, Generating new products, product development, issues for product design, service design, Process strategies, process analysis and design, product process matrix, service process design, capacity planning, capacity considerations, demand and capacity management in services.

Quality Assurance   **7 hours**
Defining quality, International quality standards, Total quality management, Tools of TQM, TQM in services, statistical process control (Statistical Control Chart, $\overline{X}$ chart, R-chart, p-chart)

Unit III: Managing Operations

Supply Chain Management   **7 hours**
Strategic importance, supply chain strategies, vendor selection, logistics management, measuring supply chain performance, outsourcing, risks in outsourcing, ethical issues in outsourcing.

Inventory Management   **7 hours**
Functions of inventory, types of inventory, inventory models for independent demand (deterministic model), material requirement planning, enterprise resource planning.

Operations Scheduling   **6 hours**
Strategic importance, scheduling issues, loading jobs, sequencing jobs, scheduling services.

JIT and Lean Operations   **4 hours**
Just-in-Time, JIT layout, JIT inventory, JIT scheduling, JIT quality, lean operations, lean operations in services.

Basic Text
   Heizer J., Render, B., & Rajashekhar J. *Operations Management.* New Delhi: Pearson Education Inc.

References
   1. Krajewski, L. J., Ritzman, L. P., Malhotra, M. K., & Srivastava S. K. *Operations Management: Process and Supply Chain.* New Delhi: Pearson Education Inc.
   2. Stevenson, W. *Operations Management.* New Delhi: Tata McGraw Hill Education.
   3. Gaither, N., & Gaither, F. *Operations Management.* New Delhi: Cengage Learning.

CMP 365 Electronic Commerce (Programming)
BCIS, 6th Semester

Course Objectives
The objectives of the course are to introduce the concept of electronic commerce, and to understand how electronic commerce is affecting business enterprises, governments, consumers and people in general.

The course would help students to:
- acquaint students with the understanding of the content and framework of e-commerce, architecture, and major e-commerce activities and mechanisms;
- understand marketplaces and list of their components;
- understand the fundamentals of social commerce, its drivers and landscape;
- understand the factors that affect customer behavior online in e-commerce systems;
- understand the foundation of digital marketing;
- understand the legal, social, and ethical issues in e-commerce;
- understand the players and their roles in e-commerce payment systems; and
- understand the fundamentals of mobile commerce infrastructure that supports mobile commerce.

Course Description
The increased commercial use of Information and Communication Technologies by individuals, business, and government makes it essential for students to understand the fundamental concept of electronic commerce (E-Commerce). There is a radical change in all kinds of organizations and the way they do business. Consumers have rapid access to better information increasing pricing and service pressure on competing firms. Workers are more production, further helping organizations to keep prices low.

The course would cover distinct areas including E-Commerce business models and concepts, E-Commerce infrastructure, building E-Commerce website, e-security and payment systems, marketing concepts and communications, ethical, social and political E-Commerce issues, online retailing, services, content and media, social networks, B2B E-Commerce.

Course Outcomes
At the end of course, students is expected to
- Explain the components, categories and role of E-Commerce environment;
- Explain different E-Commerce business models and their impact on businesses;
- Discuss the evolution of web 2.0 and its commercialization;
- Explain different technologies related to E-Commerce platform and explain client server platform;
- Describe E-Commerce payment systems;
- Explain different kind of security risks and their mitigations;
- Describe the approach of digital marketing, digital marketing techniques;
- Describe different legal, ethical, political issues related to E-Commerce; and
- Explain different real world cases of E-Commerce implementation.

Course Contents

Unit I: Overview of Electronic Commerce   **3 hours**
E-Business vs. E-Commerce; Growth of Internet and Web;   E-Commerce and its various categories; unique features of e-commerce technologies; Web 2.0; origins and growth of E-Commerce

Unit II: E-Commerce Business Models and Concepts   **3 hours**
Key elements of business models; B2B business models; B2C business models; C2C and P2P business models; M-commerce business models; Internet and its impact on business strategy, structure and process.

Unit III: E-Commerce Technology Infrastructure   **4 hours**
Internet technology; Internet Today and Future infrastructure; The world wide web; Features of Internet and Web; Web 2.0 features and services

Unit IV: Building E-Commerce Systems   **4 hours**
Planning, analysis, design, building and implementing E-Commerce systems; E-Commerce software –web server, application server, merchant software components; Concept of self service web store; Tools for managing E-Commerce systems, CGI, ASP, JSP, Ajax, JavaScript

Unit V: E-Commerce Security and Fraud Protection   **4 hours**
Scope of security in E-Commerce systems; security threats in E-Commerce environment; Technology solutions for implementing security in E-Commerce systems; management policies, business procedures and laws supporting security in E-Commerce systems; electronic transaction act (Nepal)

Unit VI: Payment Systems in E-Commerce systems   **4 hours**
Concept of electronic fund transfer (EFT); online credit card, online wallet, stored value account, digital checking payment system; electronic bill presentment and payment; mobile technology for E-Commerce payment; cases on payment system in Nepal

Unit VII: E-Commerce and Digital marketing   **4 hours**
Internet audience and consumer behavior; Internet marketing technologies and techniques; B2B and B2C marketing strategies using E-Commerce technologies; marketing communications; challenges with digital marketing strategies; SEO, affiliate site marketing, social media marketing, push/pull digital marketing

Unit VIII: B2B E-Commerce and supply chain management   **6 hours**
Procurement process and supply chain management; supply chain management systems; Electronic Data Interchange (EDI), XML and XBRLfor B2B exchanges; net market places; private industrial networks;

Unit IX: Ethical, Social, Political and Legal Issues with E-Commerce   **4 hours**
Basic ethical concepts related to E-Commerce; Privacy and information rights; Intellectual property rights; governance

Project Activity **12 hours**

Students would take up an individual/group project to study the E-Commerce system related to one of the area that includes online content, online publishing; online entertainment; social networks and online communities; online auctions; online advertisement, B2B exchanges; e-government etc. The project activity would relate the theoretical aspects of this course with the practical implementation in the above mentioned project areas.

Basic Text

Laudon, K. C., & Traver, C. G. *E-Commerce: Business, Technology, Society.* Pearson/Prentice Hall.

References

1. Turban, E., King, D., Lang, J. Linda (CON) Lai, Judy (CON) McKay, *Introduction to Electronic Commerce,* New Work: Prentice Hall.
2. Nicholas D. Evans, *Business Innovation and Disruptive Technology: Harnessing the Power of Breakthrough Technology for Competitive Advantage*, *1/E,* New Work: Prentice Hall.

CMP 366 Computer Graphics and Image Processing
BCIS, 6th Semester

Course Objectives
The objective of this course is to provide the knowledge of image processing and pattern recognition and apply these concepts in image processing and recognition applications of having commercial values in industry and business management.

Course Description
The course content is mainly focused on developing the sound theoretical foundation of all of the digital image processing stages, ranging from creation to acquisition and pre-processing to restoration. The course also requires programming assignments for deeper understanding of the various stages of image processing and pattern recognition.

Course Outcomes
Upon completion of this course, students will be able to:
- Thorough understanding of theoretical foundation of fundamental Digital Image manipulation and processing steps like acquisition; preprocessing; segmentation; Fourier domain processing; and
- Skills on exploration and appropriate use of image processing methods / tools for business and management applications.

Course Contents

Unit I: Introduction : Digital Image Processing   4 hours
Digital image representation, Digital image processing: Problems and applications, Elements of visual perception, Sampling and quantization, Some basic relationships like Neighbors, Connectivity, Distance, Measures between pixels, Visual Perception

Unit II: Image Enhancement in Spatial Domain   4 hours
Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods

Unit III: Image Enhancement in the Frequency Domain   5 hours
Introduction to Fourier Transform and the frequency Domain, Computing and Visualizing the 2D DFT, Smoothing and Sharpening using Frequency Domain Filters, Hadamard transform, Haar transform and Discrete Cosine transform, Fast Fourier Transform

Unit IV: Image Restoration   7 hours
The Image Degradation / Restoration Process, Noise Model based Restoration, Spatial filtering, Periodic Noise Reduction by Frequency Domain Filtering, Inverse filtering, Wiener filtering, Geometric Mean Filter

Unit V : Color Processing   **5 hours**
Color Fundamentals, Color Models, Pseudocolor based Image Processing, Color transformations, Smoothing and Sharpening operations

Unit VI: Image Compression   **5 hours**
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Lossless and Lossy Compressions

Unit VII: Morphological Image Processing   **5 hours**
Logic Operations involving binary images, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation

Unit VIII: Image Segmentation   **5 hours**
Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Based Segmentation

Unit IX: Pattern Recognition   **8 hours**
Descriptor concept, Chain codes, Signatures, Shape Numbers, Fourier Descriptors, Patterns and pattern classes, Overview of pattern recognition, Neural Network and Image Processing, NN based pattern recognition, Decision-Theoretic Pattern Recognition Methods.

Lab and Project Requirement
This course requires extensive exposure of practical examples with at least 8-12 lab exercises with programs consisting most of topics detailed in syllabus content. Semester end, image-processing project as a course project (either individual or group (at most 4 students) is a strict requirement for this course.

Basic Text
 Gonzalez, R. C., & Woods, R. E. *Digital Image Processing*. New Delhi: Prentice Hall of India.

References
 1. Jain, A. K. *Fundamental of Digital Image processing*. New Delhi: Prentice Hall of India.
 2. Monique, P., & Dekker, M. *Fundamentals of Pattern recognition*. New York: MIT Press.
 3. James, M. *Pattern recognition*. BSP Professional Books.

CMP 367 Data Structure and Algorithms
BCIS, 6th Semester

Course Objectives

This course aims to provide fundamental knowledge on data structure designing and implementation for storing information, and various algorithms used in computer sciences with an aim to give a feel for algorithms and data structures. They will be able to use and design linked data structures, appreciate how the inheritance mechanism of object-oriented languages enables them to write generalized code expressing an algorithm or data structure in a way that may be used in a variety of real-world situations.

Course Description

This course focuses on an arrangement of data in a computer's memory or even disk storage. It incorporates examples of several common data structures including arrays, linked lists, queues, stacks, binary trees, and hash tables. The course also includes algorithms, on the other hand, that are used to manipulate the data contained in these data structures as in searching and sorting. Many algorithms apply directly to a specific data structures. When working with certain data structures students need to know how to insert new data, search for a specified item, and deleting a specific item. Commonly used algorithms include in the course are useful for:

- searching for a particular data item (or record)
- simple sorting and advanced sorting
- iterating through all the items in a data structure

Course Outcomes

On successful completion of this module, a student will:
- have a good working knowledge of the development framework and be able to use its various features, including UI, resources, storage, security, multimedia, location, etc;
- end it appreciating that understanding the algorithm and data structures used for some problem is much more important than knowing the exact code for it in some programming language; and
- be able to understand the developed applications and use this knowledge in developing systems.

Course Contents

Unit I: Introduction   **3 hours**
What is the subject about? Mathematics review, Brief introduction to Recursion

Unit II: Algorithm Analysis   **3 hours**
Mathematical background, Model, What to analyze? Running time calculations

Unit III: Lists, Stacks, and Queues   **5 hours**
Abstract data types (ADTs), The list ADT, The stack ADT, The queue ADT

Unit IV: Trees   **6 hours**
Preliminaries, Binary trees, The search tree ADT − Binary search trees, AVL trees, Splay trees, Tree traversals (revisited), B-trees

Unit V: Hashing   **6 hours**
General idea, Hash function, Open hashing (separate chaining), Closed hashing (open addressing), Rehashing, Extendable hashing

Unit VI: Priority Queues   **6 hours**
Model, Simple implementation, Binary heap, Applications of priority queues, D-heaps, Leftist heaps, Skew heaps, Binomial queues

Unit VII: Sorting   **7 hours**
Preliminaries, Insertation sort, A lower bound for simple sorting algorithms, Shell-sort, Heap-sort, Merge- sort, Quick-sort, Sorting large objects, A general lower bound for sorting, Bucket sort, External sorting

Unit VIII: Graph Algorithm   **6 hours**
Definitions, Topological sort, Shortest-path algorithm, Network flow problems, Minimum spanning tree Applications of depth-first search, Introduction to NP-completensess

Unit IX: Algorithm Design Techniques   **6 hours**
Greedy algorithm, Divide and conquer, Dynamic programming, Randomized algorithms, Backtracking algorithms

Laboratory
There shall be 10 lab exercises based on C or JAVA
- Implementation of stack
- Implementation of linear and circular queue
- Solution of TOH and Finbonacci recursion
- Implementation of Link list: Singly, and doubly linked
- Implementation of Tree: AVL tree, Balancing of AVL
- Implementation of merge sort
- Implementation of search: sequential, Tree and Binary
- Implementation of Graphs: Graph traversals
- Implementation of hashing
- Implementation of heap

Basic Texts
1. Langsam, Y., Augustin, M.J. and Tanenbaum, A. M. *Data Structure Using C and C++*. New Delhi: Prentice Hall of India.
2. Preiss Bruno R. *Data Structures and Algorithms: With Object-Oriented Design Patterns in Java*. John Wiley & Sons Canada, Ltd.
3. Rowe, G. W. *Introduction to Data Structure and Algorithms with C and C++*. New Delhi: Prentice Hall of India.
4. Buell, D. A. *Data Structure Using Java,* Jones and Bartleft Learning.

CMP 461 Information System Security
BCIS, 7th Semester

Course Objectives
The objective of the course is to make student familiar with the basic concepts of information security including different aspects of information security from related technologies, tools to conceptualize information security governance so as to make them able to deal with information security practically.

Course Description
This course is a combination of information security governance and technologies for building an information security. It introduces students with fundamental concepts of information and information security, different types of threats and attacks, concept of encryption and key management and common tools and technologies for information security. Similarly, this course also includes information security policy, standards and best practices along with issues of managing risk, system and business continuity assurance, digital forensic and legal and regulatory issues.

Course Outcomes
- clear understanding of information security basic
- know basic terminologies and issues of information security
- able to know and use common technologies and tools required to maintain information security
- able to tackle multiple dimensions of managing information security

Course Contents

Unit I: Introduction to Information Security   6 hours
- Definition of Information Security
- The History of Information Security
- Components of Information System
- Critical Characteristics of Information
- Information security concepts and practices (CIA and other practices)
- Balancing Security and Access
- Need for Information Security

Unit II: Threats and Attacks   7 hours
- Concepts of threats
- Different Types of threats: Compromise of Intellectual Property, Deliberate software attacks, Deviations in QoS, Trespass, Forces of Nature, Information Extortion, Theft, Human error, Vandalism, Technological Obsolesce etc.
- Concept of Attack

- Different types of attacks: Malicious code, Password attacks, DOS and DDOS attack, Application attacks, Mail Bombing, Spoofing, Spams, Man-in-the-middle, sniffing, phishing, social Engineering etc.
- Internet Threats and Securities

Unit III: Cryptography and Key Management   **8 hours**
- Basics of cryptography
- Symmetric Cryptography (DES, Triple DES, AES)
- Asymmetric cryptography: Public and private keys, RSA
- Hash function
- Digital signatures
- PKI

Unit IV: Security Technologies and Tools   **8 hours**
- Firewall
- Intrusion Detection and Prevention System
- Honeypots
- Scanning and analysis tools (Port scanner, Vulnerability scanner, Packet sniffers etc.)
- Penetration Testing
- Secure Communication (VPN, SSL, IPsec, WEP, WPA, SET)
- Concept of access control, Authentication and Authorization
- Identification and authentication techniques
- Access control technique

Unit V: Information Security Policy, Standards and Practices   **4 hours**
- Basic concept and Definitions
- Categories of policies: Enterprise Information Security Policy, Issue-Specific Information security Policy, System specific Information security Policies
- ISO 27000 series
- NIST Security Model
- IETF Security Architecture

Unit VI: Risk Management   **4 hours**
- Overview of risk management
- Risk Identification
- Risk Assessment
- Risk Control Strategies
- Best practices

Unit VII: Continuity Planning   **4 hours**
- Incidence Response Planning
- Business continuity planning
- Disaster recovery planning

Unit VIII: Introduction to Auditing and Digital Forensic   **3 hours**
- Auditing
- Monitoring
- Digital Forensic :Team , methodology and procedure

Unit IX: Legal, Ethical and Professional issues in Information Security   **4 hours**
- Relevant Laws
- International Laws and Legal Bodies
- Related laws in Nepal, their provisions and limitations.
- Ethical Concepts in Information Security
- Codes of Ethics, Certifications, and Professional Organizations

Basic Text

Whitman, M. E., & Mattord, H. J. *Principals of Information Security.* New Delhi: Cengage Learning.

References
1. *Official (ISC)²® Guide to the CISSP® CBK®,* Third Edition, (ISC)²Press.
2. Stallings, W. *Cryptography and Network Security: Principles and Practice.* Prentice Hall.

CMP 462 IT Project Management
BCIS, 7th Semester

Course Objectives
IT Project Management is the course designed to prepare the students with the fundamental concepts of project management so that they are familiarized with the complexity and challenges of managing projects. The principal focus under the course is to understand the specifics related to IT systems project including various knowledge processing issues.

Course Description
Students will gain a sound understanding of project management concepts and principles by applying relevant tools and techniques. In order to assimilate the project management knowledge, the course requires extensive use of case studies and computer tools to carry out various simulation exercises.

Course Outcomes
At the conclusion of the course, students should be able to:
- Fundamental learning and use of various project management tools and techniques;
- Skills on exploration and appropriate use of computer based applications and tools related to project design, planning, scheduling, budgeting, process control and monitoring;
- Understanding the complexities, criticalities and specific problems related to IT project, which are primarily non-existent on non-IT projects; and
- Appreciation towards the critical role of human resources and experiential knowledge in ensuring timely and successful project completion.

Course Contents

Unit I: Introduction   6 hours
Project Management Institutes' (PMI) Framework, Project Management Body of Knowledge, Project Portfolio Management, The project management profession;   Characteristics of project life cycles, IT Product Development Life Cycle, Product Life Cycle and Project Life Cycle, System Development methodologies, Stakeholder management

Unit II: Project Formation, Integration and Scope Management   7 hours
Develop project charters, Develop preliminary project scope statement, Develop project management plan, Scope verification, Project scope management, Scope control, Project group formation, Resource allocation and matching, Direct and manage project execution, Project monitoring, Controlling project work, Create Work Break Down Structure, Project Integration management, Change management.

Unit III: Project Time Management   6 hours
Activity definition, Decomposition and sequencing of project activities, Estimation of Activity resources and duration, network diagram, precedence diagram method with dependencies, Gantt charts, CPM and PERT methods.

Unit IV: Project Cost Management   **6 hours**
Cost management, Project cost estimating, types of cost estimates, estimating process and accuracy, organizational process and assets valuation, cost estimating tools, Cost budgeting, cost aggregation, deriving budget from activity cost, Cost control process, cost control methods, Earned Value Management (EVM) and Project Portfolio Management (PPM).

Unit V: Project Quality Management   **4 hours**
Quality theories, TQM and ISO statements; Quality planning, Project quality requirements, Quality management plan, Quality assurance, Quality audits, Quality control process, Quality tools like Control chart, Pareto charts, Six Sigma and Testing.

Unit VI: Project Communication Management   **4 hours**
Communication management requirement and issues, Communications planning process, Effective meeting organization and conduction, Information distribution process, Performance reporting process, integrated reporting system, Report standards.

Unit VII: Project Risk Management   **5 hours**
Risk concept, Qualitative and quantitative risks, Risk management planning process, Project risk assessment, Qualitative and Quantitative risk analysis processes, Risk Analysis Methods based on Probability Matrices, Decision Trees, Expected Monetary Value, Simulation, and Sensitivity Analysis, Risk modeling techniques, Risk response planning, Risk monitoring and control process.

Unit VIII: Human Resource Management   **3 hours**
Human resource planning, Motivation theories, Project organizational chart, Responsibility assignment matrices, Staffing management plans with resource histograms, Resource assignment, loading and leveling, Project team development, Training, team building, and reward and recognition systems, Project Teaming tools and techniques

Unit IX: Project Procurement Management   **5 hours**
Procurement management process flow, Plan purchases and acquisition process, Bid document preparation, Evaluation and selection criteria, Contract process plan, Standard forms, Contract administration process, Contract closure process. Public procurement legalities in local context such as Nepalese PPMO guidelines and e-bidding procedures.

Unit X: Other Specifics   **2 hours**
Project timing issues, Knowledge transfer issues, Change management issues, IT Project as product delivery versus service delivery.

Case Studies
This course requires extensive exposure of practical examples with at least SIX relevant case studies.

Basic Text
   Schwalbe, K. *Information Technology Project Management*. New Delhi: Cengage Learning.

References

1. Portny, S. E. *Project Management For Dummies*. New York: Wiley.
2. Meredith, J. R., & Mantel, S. J. *Project Management : A Managerial Approach*. New York: Wiley.

Course Objectives
This course serves as an introduction to Human Resources Management (HRM) and its contributions to the workplace. Today's organization faces a variety of complex issues, such as globalization, demands for increased productivity, strategic planning and compliance with government legislation. In today's world, "people" provide the competitive advantage, and HR policies and practices have a significant impact on the bottom line and overall performance of an organization.

Course Description
The course will examine the evolution of HR from a primarily administrative function to a strategic partner and decision maker in the organization. Among other things, the course will look at the effective management of human capital, the importance of attracting and retaining employees, managing a diverse workforce, recognizing employee rights, and legislative requirements. The course specifically deals with the concepts and issues relating to recruitment, selection, and retention practices, evaluating performance, employee development, compensation regulations, employee relations as well as related areas.

Course Outcomes
On successful completion of this course, students will be able to:
- Discuss the relationship between human resource management, the organization and its internal and external environment;
- Explain the concepts and principles of HR planning, job analysis and job design and define the related terms like job description and job specification;
- Explain the recruitment and selection processes and methods;
- Explain the concept, purpose and techniques of employee training, training needs identification, management development, and career development;
- Demonstrate understanding of the performance appraisal concept and examine the techniques of measuring individual performance;
- Discuss the conceptual framework of job evaluation, compensation and rewards management and their application in organizational context;
- Explain the nature of occupational disease, health and safety programs, and responses that ensure legal compliance;
- Explain the concept of labour relations system, collective bargaining, grievance handling, disciplinary actions and industrial actions.

Course Contents

Unit I: Human Resources Management: Concept and Context   5 hours
The concept of HRM; Functions of HRM; Changing dimensions of HRM; Changing role and challenges of HRM managers; Essential skills for HR managers; Purpose and structure of HR

department; HRM as a shared function; External and internal context of HRM; HRM in the Nepalese context.

Unit II: Human Resources Planning and Recruitment   10 hours
Job requirements - the role and importance of jobs; Relationship of job requirements to HRM functions; Job analysis and Job design – concepts, methods and outcomes; Human resources planning – importance, purpose and major elements of HR planning; HR inventory; Replacement and succession planning; Recruiting from within and outside the organization; Recruitment of protected classes; Electronic recruitment; Selection process; Matching people and jobs; Sources of information about job candidates; Employment interview; Employment tests; Reaching a selection decision; Issues of gender in recruitment and selection; Induction and placement.

Unit III: Training and Career Development   8 hours
Training as a system; Training as a tool for developing work culture; Designing training programs; Training needs assessment – concept and methods; Training non-managerial employees; Training managers and supervisors; Training methods; Psychological principles of learning; Evaluation of training programs; Career development - phases and objectives of career development; Management development techniques; Emerging concepts of HRD – leadership development, talent management, empowerment, mentoring; HRD practices in Nepalese organizations - career management and employee retention issues.

Unit IV: Performance Appraisal   4 hours
Concept, process and benefits of performance appraisal; Performance appraisal methods; Appraisal interviews; Factors affecting performance appraisal; PA practices in Nepalese organizations; Improving employee performance; Counseling employees with problems.

Unit V: Compensation Management   7 hours
Concept, process, methods of employee compensation; Job evaluation systems – concept and methods; Compensation structure and components; Employee benefits – incentive system, gain sharing, employee benefits and services, types of employee benefit; Incentives for management employees; Governmental regulations of compensation in Nepal – minimum wages, welfare and incentive provisions, retirement benefits; Issues in compensation management in Nepal.

Unit VI: Safety and Health at Work   4 hours
Legal requirements for safety and health; Accidents; Occupational diseases and other health issues; Sexual harassment at work; Drug and alcohol related problems; Creating a safe and healthy work environment; Emerging concepts and issues in OHS.

Unit VII: Industrial Relations and Disciplinary System   10 hours
Disciplinary policies and procedures; Types of disciplinary actions; Grievance handling methods and mechanisms; Methods of reducing complaints; Industrial relations system – concept, process and issues; Trade unions - structures, functions, and leadership; Trade union issues in Nepal; Industrial disputes – nature and types; Government regulations of labor relations; Collective bargaining process and contract administration; Trends and issues in collective bargaining in Nepal.

Basic Texts

1. DeCenzo, D. A., & Robbins, S. P. *Fundamentals of Human Resources Management*. New Delhi: Wiley India.
2. Dessler, G., & Verkkey, B. *Human Resource Management*. New Delhi: Prentice Hall of India.

References

1. Gilmore, S., & Williams, S. *Human Resource Management*. New Delhi: Oxford University Press.
2. Halder, U. K., & Sarkar, J. *Human Resource Management*. New Delhi: Oxford University Press.
3. Ivancevich, J. M. *Human Resource Management*. New Delhi: Tata McGraw Hill.
4. Adhikari, D. R. *Human Resource Management*. Kathmandu: Buddha Publications.
5. Acharya, B. S. *Introduction to Human Resource Management*: *Text, Cases and Applications*. Kathmandu: Asmita Books.
6. Agrawal, G. R. *Human Resource Management*. Kathmandu: K. K. Publications.
7. Jyothi, P., & Venkatesh, D. N. *Human Resource Management*. New Delhi: Oxford University Press.

MGT 412 Strategic Management
BCIS, 8th Semester

Course Objectives
This course aims to familiarize students with the basic concepts of strategic management and enable them to formulate, implement, and evaluate strategies for businesses. The course also aims to develop comprehensive and integrated view of business. The ultimate objective is to develop skill of practical and integrated application of different fields of management in order to make strategic decisions.

Course Description
Starting from the establishment of a company's direction by preparing mission statement and vision, this course will proceed to the identification of opportunities and threats emerging from the external environment and assessment of strengths and weaknesses arising from the internal environmental forces. Development of tools needed to match opportunities and threats with strengths and weaknesses will be the next step. Concepts of removing possible hurdles in the implementation of strategy will be followed by the discussion on the implementation of strategy. Finally, issues related to strategic evaluation and control will be discussed.

Course Outcomes
Upon completion of this course, students should be able to:
- Establish and evaluate mission statement, long term objective, vision, and short term plan for the business;
- Analyze the external and internal environment and identify opportunities, threats, strengths, and weaknesses of the firm and thereby formulate appropriate strategies for business;
- Plan pre-implementation and implementation phase; and
- Monitor and evaluate implemented strategies.

Course Contents

Unit I: Introduction   **4 hours**
Meaning of strategy and strategic management; Strategic Management Model; Characteristics of strategic management; Formality in strategic management.

Unit II: Company Direction   **3 hours**
Mission and mission statement; Vision; Strategic intent; Strategic objective vs. Financial objective; Policies; Long term and short term objectives.

Unit III: External Environment Analysis   **10 hours**
PEST analysis - political, legal, economic, socio-cultural, technological, ecological, and international environment analysis framework (individualism vs. collectivism, totalitarian system vs. democracy, common law vs. civil law system; Determinants of culture; State of technological

stage; Impact of ecological and international factors); Industry and competitive analysis - Porter's five force model; Strategic group mapping; Monitoring competition.

Unit IV: Internal Analysis   5 hours
Resource to competitive advantage pyramid; Internal analysis approaches - value chain; functional approach; and Resource based view (RBV); Benchmarking.

Unit V: Strategic Options and Choice Techniques   10 hours
Porter's generic strategies: Cost leadership, Differentiation, Grand Strategies (concentration, market development, growth and expansion, product development, innovation, vertical and horizontal integration, concentric and conglomerate diversification, retrenchment/turnaround, divesture, liquidation, bankruptcy, joint venture, and strategic alliance); Corporate level analytical tools - BCG and GE nine cell matrices; Business level analytical tools - grand strategy selection matrix and grand strategy cluster.

Unit VII: Strategic Implementation   11 hours
Concept and steps of strategy implementation, Operationalisation of strategies: Annual objectives; functional planning (Finance, Marketing, Human Resource, R&D, Production Operations, MIS and General Management); Communications, Guidelines and policies, Institutionalization: structure, types, matching structure with strategy; Resource allocation and budgeting and role of leadership in strategy implementation.

Unit VII: Strategic Evaluation and Control   5 hours
Difference between strategic and operational control; Strategic control tools - premise control, strategic surveillance, implementation control, and special alert.

Basic Texts
1. Pearce, J. A., Robinson, R. B., & Mital, *Strategic Management: Formulation, Implementation, and Control*. New Delhi: Tata McGraw Hill.
2. Hitt, M. A., Ireland, R. D., Hoskisson, R. E., & Manikutty, S. *Strategic Management: A South-Asian Perspective*. New Delhi: Cengage Learning.

References
1. Dess, G. G., Lumpkin. G. T., & Eisner, A. B. *Strategic Management: Text and Cases*. New Delhi: Tata McGraw Hill.
2. Thomson, A., & Strickland, *Strategic Management*. New Delhi: Tata McGraw Hill.
3. Relevant journal articles and cases.

LAW 291 Legal Aspects of Business and Technology
BCIS, 8th Semester

Course Objectives

This objective of this course is to place business and technology in their proper and prominent legal context. The intention of this course is to prepare students to be successful both personally and professionally in an information-based society.

Course Description

The course is divided into three different sections. In the first part, the concept of legal environment, sources of business laws, and the format, structure and operating practicality of the court systems in Nepal will be discussed. The second part deals with contracts, sale of goods, agency, different forms (types) of doing business, areas of regulatory relationship, and arbitration laws. The final sections are an overview of different types of laws relating to business and technology.

Course Outcomes

After studying this course, students should be able to:
- Explain the concept of legal environment and the court system in Nepal;
- Have an understanding of the basic legal principles and concepts;
- Discuss the role and development of the legal aspects for business and technology under the Nepalese legal system;
- Describe the impact of major areas of law on business operations, particularly where technology is concerned;
- Explain the legal and regulatory compliances in the context of Nepalese business;
- Discuss the provisions of Nepalese laws and regulations relating to information technology/intellectual property.

Course Contents

Unit I: Basics of Legal Environment and Court System   6 hours

Concept and importance of legal environment; Nature, types and sources of law; Meaning and sources of business law in Nepal; The court system - structure, powers, organization and jurisdiction of the court systems; Civil procedures in Nepal; Provisions of the Nepalese Constitution pertaining to business; Changing dimensions of legal environment in Nepal

Unit II: Nepalese Contract Law   10 hours

Concept of contract; Valid, void and voidable contracts; Essentials of a valid contract; Offer and acceptance; Consideration; Free consent; Contingent contract; Performance of contract; Termination of contract; Breach of contract and remedies; Meaning of bailment and pledge; Rights and duties of bailor/bailee and pledger/pledge; Pledge by non-owner; Finder of lost goods; Discharge of liability; Contract of indemnity and guarantee; Rights and duties of surety.

Unit III: Sale of Goods   4 hours
Meaning and feature of the contract of sale of goods; Types of goods; Conditions and warranties; Transfer of ownership; Unpaid seller; Suits of breach of the contract; Performance of the contract of sale of goods.

Unit IV: Agency and Business Organization   10 hours
Law of agency: Creation and modes of agency – Classification of Agents – Relation of Principal and Agent – Rights and duties of principal agents, sub-agents, substitute agent; Relation of Principal with Third Party – Personal liability of Agent – Termination of Agency; Classification of companies; Formation and incorporation, registration, memorandum and articles of association, prospectus, shares and share capital, borrowing powers - debentures, board of directors and board meetings, minutes and resolution, auditing, dissolution, winding up, liquidation; Arbitration - powers of arbitrator, duties of arbitrator, revocation of arbitrator's authority .

Unit V: Legal and Regularity Compliance   5 hours
Basic features and compliances requirement as per: Industrial Enterprises Act, Financial Institutions Act, Legal provisions relating to negotiable instruments, Right to Information Act; Consumer Protection Act. Introduction and major provision of Labor Act, Anti-Money Laundering Laws.

Unit VI: Laws Relating to Information Technology/Intellectual Property   13 hours
Trade-Related Aspects of Property/Intellectual Property - Definition, scope and importance of intellectual property; Types of intellectual property, *e.g* patent, design, trade mark, industrial design, layout design, integrated circuit; Existing laws on intellectual property in Nepal; WTO's Treaty on Trade-Related Aspects of Intellectual Properties; Agreement relating to transfer of technology (supervisory mechanism-licensing and franchising), royalties and compliance of laws; Cyber law - Electronic Transactions (Digital Signature Attestation) Act, 2063 (especially on the crime and punishment); Nepal Telecommunication Act, 2045; Foreign Investment and Technology Transfer Act, 2049.

References
1. Wagle, R., & Pant, K. B. *Legal Environment of Business in Nepal*. Kathmandu: Ratna Pustak Bhandar.
2. Kalika, S. N. *Business Law*. Kathmandu: Buddha Academic Enterprises Pvt. Ltd.
3. Albuquerque, D. *Legal Aspects of Business*. New Delhi: Oxford University Press.
4. Singh, Y. *Cyber Laws*, New Delhi: Universal Law Publishing Co.
5. *Related Nepal Acts and Regulations*
6. WTO. *A Final Act on the Embodiment of WTO*, Geneva: WTO publications.
7. Dhakal, D. R. *Business Law*. Kathmandu: Ashmita Publication.

CMP 464 Digital Economy
BCIS, 8th Semester

Course Objectives
The course aims to impart students with the knowledge on basic fundamentals of an economy based on digital technologies .

Course Description
This course is designed to help students build cognitive foundation for fully understanding the linkages among digital technologies, economy and society at large in the context of emerging knowledge economy and knowledge societies. At the completion of the course, the students will be able to articulate overarching fundamentals of digital economy and would have developed sufficient conceptual grounding for further studying and analyzing key elements of digital economy. The course delivery method would entail class room lectures based on both primary and secondary sources of information and knowledge backed by deliberations on case studies and real world examples. Pedagogical method to be employed would encourage classroom discussions and references to materials from varied sources.

Course Outcomes
After completing the course:
- students will have sufficient theoretical and conceptual grounding on fundamentals that define emerging knowledge and digital economy;
- students will be able to effectively pursue advanced studies in emerging IT paradigm; and
- students will equip themselves with knowledge on ways and means of creating organizational value and leveraging ICTs and knowledge resources as tools for securing competitive advantages in organizations.

Course Contents

Unit I: Fundamentals of Knowledge Dimensions of Economy   3 hours
Role of information and knowledge in society and economy, value of Information, Information and knowledge as factors of production, knowledge and value creation, Concept of knowledge management, Contemporary practices in information and knowledge management in creating organizational value

Unit II: Development of knowledge based societies   5 hours
Conceptual premise: ICTs and development, Delivery of public information and services through digital means - e-government, e-Business; Policy issues and national policy and regulatory framework, , Infrastructural issues and challenges, The need for Intellectual and cultural shift; Emerging technological trends and their policy ramifications, Media/Digital convergence, Broadband and IP-enabled services, basic concept of telecom regulation and Radio-spectrum management

Unit III: Fundamentals of e-Readiness and its Assessment Techniques   2 hours

Unit IV: Role of Information and Communications Technologies in Economic Development
4 hours

Economic and Social dimensions of ICTs: ICTs and economic growth interlink ages, ICTs and Development interlink ages, IT enabled business and service delivery models, BPO/BPM/IT-ITeS landscape and fundamentals, Positioning Nepal in global sourcing landscape

Unit V: ICTs and Enterprise Level Value Creation   4 hours

ERP (Enterprise Resource Planning), CRM (Customer Relationship Management)

Unit VI: Fundamentals of Knowledge Economy   7 hours

Internet economy, E-business – Conceptual premise and topologies, Leveraging ICTs to build brand awareness and expanding product and services visibility, Components of fully integrated e-business models involving Enterprise, Manufacturing, Distribution, Financials, Human Resources, Suppliers, concepts of value proposition, value chain and integrated value chain with examples, ICTs and Supply chain management, Electronic sourcing and procurement, Integrated forecasting, Quality System Management; Electronic Commerce: Customer Service, Interactive marketing, Demand forecasting, Order Management, Developing e-business models,

Unit VII: E-commerce   2 hours

Topology of e-commerce - B2C, B2B and B2G, Prospects, Issues and challenges, Payment mechanisms, Order fulfillment, Payment gateways, Nepal e-Commerce landscape, issues and challenges

Unit VIII: Issues on Developing E-Commerce Based Business Models   4 hours

Analyzing value proposition, Techno graphic profiling, case studies in e-Commerce/e-Business, Impact of ICTs based implementations on traditional business models on some verticals: travel, entertainment and hospitality industries

Unit IX: Financing   3 hours

Elements of knowledge industry growth ecosystem, Concept of Venture capital (VC), Angels

Unit X: Information Economy: Requisite Infrastructure   3 hours

Regulatory regime, Trust - governance and accountability, Operational issues,

Unit XI: Emerging/Evolving Technology Landscape and their Implications on Digital Economy   5 hours

Concepts of business/competitive intelligence and business analytics, social media, mobile and cloud computing, Data mining and Big Data Analytics, Cyber security and Public Key Infrastructure (PKI)

Unit XII: Information Economy Landscape: Nepal   3 hours

IT policy and strategy, Application of ICTs in public and private sector, Level of e-business related activities, prevailing Regulatory instruments, Opportunities/Constraints/ limitations

Unit XIII: Internet Access and Infrastructure Related Issues   3 hours
Telecom policy, Telecom infrastructure, ISP's, Issues impinging upon ICT penetration and uptake in the country

Basic Texts
1. Tapscott, D. *The Digital Economy*. McGraw Hill Inc.
2. Tapscott, D., Lowy, A., & Ticoll, D. *Blueprint to the Digital Economy*. New Delhi: McGraw Hill Inc.
2. Tissen, R., Andriessen, D., & Deprez, F. L. *The Knowledge Dividend, Financial Times*. New York: Prentice Hall.
3. Timmers, P. *Electronic Commerce*. New York: John wily & Sons, Ltd.

References
1. Trepper, C. *E-Commerce Strategies*. Microsoft Press 2000.
2. *IT Policy 2000*, National Planning Commission. Government of Nepal.
3. *Electronic Transaction Ordinance, 2061*. Government of Nepal.

Electives

CMP 469 Mobile Computing (Programming)

Course Objectives
- Understand the Android OS architecture.
- Install and use appropriate tools for Android development, including IDE, device emulator, and profiling tools.
- Understand the Android application architecture, including the roles of the task stack, activities, and services.
- Build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
- Use advanced UI widgets for scrolling, tabbing, and layout control.
- Present menus via the Android action bar and handle menu selections.
- Store application data on the mobile device, in internal or external storage locations.
- Support user-specific preferences using the Android Preferences API.

Course Description
This course introduces mobile application development for the Android platform. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android applications, with particular emphasis on software engineering topics including software architecture, software process, usability, and deployment.

Course Outcomes
On successful completion of this module, a student should be able to develop Android applications.
In particular:
- have a good working knowledge of the development framework and be able to use its various features, including UI, resources, storage, security, multimedia, location, etc.
- have a good working knowledge of Android Studio, including debugging in emulator and real hardware.
- use best design practices for mobile development, designing applications for performance and responsiveness.
- be able to sign and publish developed applications.

Course Contents

Unit I: Review of Java Programming   **2 hours**

Unit II: Getting Started With Android Programming   **4 hours**
Introduction to Android, Android Versions, Features of Android, Architecture of Android, Dalvik Virtual Machine, Obtaining the Required Tools, Android SDK, Android Studio and Android Development Tools (ADT), Creating Android Virtual Devices (AVDs) – Pros and

Cons of Emulator, Working with Emulator using telnet Command (Network, Power and SMS), Interacting with Multiple Emulator, Steps to Create Android Application, Android App Resources, The Main Activity File, The Strings File, The R File, The Layout File, The Manifest File, The Gradle File

Unit III: Activities, Fragments and Intents   10 hours
Understanding Activities, Introduction, Life Cycle of Activities, Creating an Activity, Declaring the Activity in the Manifest, Starting and Shutting Down the Activity, Android Task Backstack, Intents, Introduction, Types of Intents, Intent Objects , Intent Fields - ACTION, DATA, CATEGORY, TYPE, COMPONENT, EXTRAS and FLAGS, Intent Filters, Linking Activities Using Intents, Resolving Intent Filter Collision, Returning Results from Intent, Passing Data Using an Intent Object, Fragments, Introduction, Life Cycle of a Fragment, Adding Fragments Dynamically, Interactions between Fragments, Calling Built-In Applications Using Intents, Understanding Intent Object, Using Intent Filters, Adding Categories, Displaying Notifications, Understanding Permissions, Defining & Using Application Permissions, Component Permissions & Permissions Related APIs.

Unit IV: Android UI   5 hours
Understanding the Components of a Screen, Views and View Groups, Layouts (Linear, Absolute, Table, Relative, Frame and Scroll View), Adapting to Display Orientation, Anchoring Views, Resizing and Repositioning, Utilizing the Action Bar, Adding Action Items to the Action Bar, Customizing the Action Items and Application Icon

Unit V: Designing UI with Views   7 hours
Using Basic Views, Text View, Button, Image Button, Edit Text, Check Box, Toggle Button, Radio Button, Radio Groups, Progress Bar and Auto Complete Text View, Event Handling, Event Listeners and Handlers, Event Listeners Registration, Event Handling Examples, Event Listeners Registration Using an Anonymous Inner Class, Registration Using the Activity Implements Listener Interface, Registration Using Layout File, Using List View and Spinner View, Understanding Specialized Fragments, Using a List Fragment and Preference Fragment

Unit VI: Displaying Menus with Views   2 hours
Using Menus with Views, Creating the Helper Methods, Options Menu, Context Menu, Working with Web View

Unit VII: Data Persistence   5 hours
Saving and Loading User Preferences, Accessing Preferences Using an Activity, Persisting Data to Files, Saving to Internal and External Storage, Using Static Resources, Creating and Using Databases, Introduction to SQLite, Creating the Database Helper Class, CRUD Operation in SQLite

Unit VIII: Messaging   2 hours
SMS Messaging, Sending SMS Messages Programmatically, Sending SMS Messages Using Intent, Sending E-Mail

Unit IX: Networking   **3 hours**
Consuming Web Services Using HTTP, XML Parsing, JSON Parsing

Unit X: Developing Android Services   **4 hours**
Creating Your Own Services, Creating a Simple Service, Performing Tasks in a Service Asynchronously, Performing Repeated Tasks in a Service, Understanding Threading

Unit XI: Using Third Party Libraries   **3 hours**
 Examples like Picasso, Volley, GSON, Develop sample app using third party APIs

Unit XII: Deploying Android Apps in Play Store   **1 hour**

Basic Text
Lee, W. M. *Beginning Android 4 Application Development*. WROX Publication

References
1. Simon, J. *Head First Android Development*. New Jersey: O'Reilly Media.
2. Meier, Reto. *Professional Android 4 Application Development*. USA: WROX Publication

CMP 471 Dot NET Technology

Course Objectives
This course aims to familiarize students with various technologies brought about or changed by the introduction of the .NET framework, and enable them to be able to develop different kinds of applications using these technologies.

Course Descriptions
This course includes all the basics required to develop systems in .NET platform. This platform has evolved quickly to become a robust technology platform for enterprise application development and systems integration. Prerequisite for this course is programming concepts in at least one of C++, Java or Visual Basic Object Oriented Programming.

Course Outcomes
After completion of this course carrying out both theory and practical sessions, students will be able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following:
- Explain the architecture of Dot Net Technology.
- Develop single form based .simple Net applications using basic and advanced control
- Develop multiple form and menu based .Net applications
- Develop small ADO.net based database driven .Net application
- Implement and trouble shoot simple and also complex .Net Applications

Course Contents

Unit I: .NET Fundamentals   **2 hours**
History, Overview, Terminology, Advantages

Unit II: Windows Development using .NET   **5 hours**
Overview – Structured programming and OOP, C#, Windows Forms

Unit III: Web Development using .NET   **6 hours**
Overview – HTML, JavaScript, ASP.NET Web Applications using MVC, ASP.NET Mobile applications

Unit IV: Web Services using .NET theory   **6 hours**
Overview – Web Services and their applications, XML, XML Web Services, SOAP, and REST

Unit V: Database Development using .NET   **6 hours**
Overview – Database concepts and SQL, ADO.NET, and Data

Unit VI: .NET Common Language Runtime   **7 hours**
Overview, Assemblies and JIT, Garbage Collection, Security, Events and Delegates, Reflection, Remoting, CLS and Interop

Unit VII: .NET Framework Class Library   8 hours
Overview, GDI+, Exceptions, Input/Output, Threading, Windows Service Applications

Unit VIII: Case Studies   8 hours
Developing ASP.NET MVC Web Applications, Developing Network Applications Creating and Publishing Customizable Application, Database Application

.NET Technologies Lab Plan

Language to be used
Labs will be conducted in C#. The first few labs will be introductory to Visual Studio and C#. These labs will enable the students to migrate from C++ to C#

Lab Procedure:
The lab sheet will be provided to the students one week before the lab. The lab sheet will indicate relevant chapters in the book. Students are required to study the related chapters from the book and prepare a pre-report before coming to the lab. The lab instructor will make a presentation explaining the concepts, through the use of one or several typical program. In the lab, students will modify the program as instructed, or write an entirely new program similar to the one presented.

Buffer Labs
In addition to accommodate for labs that could not be conducted, buffer labs can be used to repeat past labs, or complete labs that were not completed in the assigned session. However, at the end of the buffer lab, the student should have submitted all lab reports until that point.

    Lab 1 - Introducing the Visual Studio .NET IDE
    Lab 2 - Introducing the C# language: Structured Programming and exception handling
    Lab 3 - Introducing the C# Language: Object Oriented Programming
    Lab 4 - Buffer
    Lab 5 - HTML, JavaScript
    Lab 6 - Model, View and Controller
    Lab 7 - Controller and Action Result
    Lab 8 - Buffer
    Lab 9 - Loops and Conditionals
    Lab 10 - Databases and Entity Framework
    Lab 11 - Publish and Deploy Application
    Lab 12 - Buffer
    Lab 13 - File I/O
    Lab 14 - ASP.NET Web Forms
    Lab 15 - Windows/Console Application
    Lab 16 – Buffer

Basic Text
  ▪ Deitel ,P, Deitel H, *C# - Visual C # How to program New York:* Pearson Education

Reference

- Adrian Turtschi,C#.Net *Web Developers' Guide.*

CMP 472 Routing and Switching

Course Objectives
The main objective of this course is to make students familiar with the fundamentals on networking and routing

Course Description
This course describes the communication architecture based on TCP/IP and OSI reference model. It also describes the various routing and switching protocols practiced by organization while doing communication based on internet. Also for security management on guided and unguided media are discussed.

Course Outcomes
Students after going through this course will be able to work as Network Administrator, Network Designer and System Administrator.

Course Contents

Unit I: Introduction to networks   **2 hours**
Exploring the Network, Network protocols and communications, Network Access, Standards Organizations and RFCs

Unit II: Review of Network Layers   **4 hours**
TCP /IP Protocol System, TCP /IP and OSI Model, Data Packaging, Data Link Layer, Network Layer, IP Addressing and subneting, Introducing basic Ipv6, Understanding IPv6

Unit III: Ethernet Technology   **2 hours**
Ethernet Operation, Ethernet Technologies, 10/100mbps Ethernet, 1/10Gbps Ethernet

Unit IV: Switching and Basic routing   **14 hours**
Implementing VLANS and Trunks Routing Between VLANS, Troubleshooting VLAN Connectivity, Understanding Spanning Tree Protocol, Understanding and Configure Ether-channel, Understanding Layer 3 Redundancy protocols (HSRP ,VRRP,GLBP) Introduction to Routing and Packet Forwarding, Static Routing, Introduction to Dynamic Routing, Distance vector Routing Protocols, Link State Routing Protocols, Interior and Exterior Gateway Protocols, IPv4, Routing, Forwarding, Some definitions, Policy Options and Routing protocols

Unit V: Distance Vector Routing protocols   **5 hours**
RIP Version 1 and RIP Version 2, Background and history of EIGRP, Features and operation of EIGRP, Basic EIGRP Configuration, Calculate the composite metric used by EIGRP, Concepts and operation of DUAL

Unit VI: Link State Routing   **5 hours**
OSPF Introduction, OSPF area, LSA Types, Definition and Concepts, How OSPF Works, Route, Summarization, How OSPF Works, Default Routes, Virtual Links, Demand Circuits, Stub Areas, OSPF Design, Trouble Shooting, Summary

Unit VII: Access List   **3 hours**
Standard Access List, Extended Acess List, Matching Access List, Building and Maintaining Access List, Case Study

Unit VIII: Services in Converged WAN   **2 hours**
The Key WAN Technology Concept, Identify the appropriate WAN Technologies to use with typical, Enterprise requirements for WAN Communications, Introduction to ISDN, Introduction to Frame Relay

Unit XI: Enterprise Network Security   **3 hours**
General Methods used to mitigate security threats to Enterprise Network, Configure Basic Router Security, Configure Basic Switch Security, Disavle unused network services and interfaces, Manage IOS Services

Unit X: Wireless Networking Technology   **4 hours**
802.11 Physical Layer Standards, Wireless System Configuration, Infrastructure Mode Configuration, Ad Hoc Mode Operation, Wireless Configuration Parameters, Wireless Security, RF Signal Concept

Unit XI: Site to Site Ipsec VPN   **4 hours**
VPN Basics, IPSec Protocols, IPSec Point to Point VPN

References
1. E. Brad, U Jacob CCIE *Routing and Switching*. USA: Cisco Press.
2. H Joe CCNA *Routing and Switching*. USA: Cisco Press.

CMP 473 System Administration on Windows and Linux

Course Objectives
This course will provide the knowledge and hands-on skills necessary to manage a Local Area Network and its resources. Topics covered include directory services, server management, file and print services, and user/client administration in a heterogeneous operating system environment. Students will setup and manage a fully functioning computer network of systems both on Linux and Windows Platform.

Course Descriptions
The main emphasis of the course is on System and Network Administration. The fundamentals of network services, Internet services, security, problem solving and scope will be covered.

Course Outcomes
By the end of this course, students should be able to:
- Use multiple computer system platforms, and understand the advantages of each;
- Install and administer network services;
- Protect and secure users' information on computer systems;
- Use the command line interface for system administration;
- Demonstrate strategies for planning/designing systems;
- Install and manage disks and file systems; and
- Enable above learning outcomes in Windows and Linux environments.

Course Contents
The contents in the courses keeps on updating in no time. This is the reason to highlight only the unit headings. Course instructor is responsible to include the latest developments and deliver it to the students without missing fundamentals of the course.

The following topics are included:
- System Startup and Operation
- Disk Unititioning and Filesystem Installation
- Filesystem and Device Manipulation
- Process and Log Analysis
- Startup Scripts and Configuration Files
- User/Group Security and Permissions
- Print Spooling, File Formats and Media Access
- Backup
- Scheduling Maintenance Functions
- Firewalls, Security and Privacy
- DNS Service: Concepts and Client Resolver
- DNS Service: Configuration
- File and Print Service: Concepts and Operation
- File and Print Service: Configuration and Cross-Platform Issues

References

1. T. Collings & K. Wall*Red Hat Linux Networking and System Administration*. USA: Wiley Publishing, Inc.
2. M. Tulloch Introducing *Windows Server 2012 R2, Technical Overview*, Microsoft Press.

CMP 474 Mobile and Wireless Communication systems

Course Objectives

The course is designed so as to make students familiar with Mobile and Wireless Communication Systems with following objectives:

- To enhance awareness regarding the expanding role of satellite systems in individuals' daily lives
- To deliver a strong technical foundation of the basic principles and functioning of these satellite systems for personal communications, navigation, broadcasting and sensing applications
- To illustrate current practice using selected example systems in each field
- To review current trends in relevant satellite and related technology

Course Description

This course gives an introduction to mobile and wireless communications systems and its techniques. Most of the course will be covered by the lectures, field visits and student's presentations. The course is also highly case study oriented, involving hand-on exploration of existing technologies as well as development of new technologies.

Course Outcomes

After completing the course students will be familiar with the Global system for mobile communication, satellite communication and techniques. Students will know the basics of wireless techniques which are essential for them be familiar with so as to develop mobile and wireless systems.

Course Contents

The following themes or topics must be covered:

- Introduction, Global System for Mobile Communications, Satellite Communications Systems
- Satellites and High-Altitude Platforms, Modulation and coding, Satellite access and Networking,
- Spectrum and propagation, Antennas and Noise, Modulation and Coding
- Compression, Speech, Audio and Video Encoding
- Digital Broadcasting Techniques and Architectures, Broadcast Systems, Communications Architectures
- Remote Sensing Techniques, Remote Sensing Systems, the Future
- General Packet Radio Service (GPRS), Hash Function, Message Authentication Code, and Data Expansion Function

References

1. M. Richharia, L. D *Westbrook Satellite Systems for Personal Applications Concepts and Technology*. John Wiley & Sons Ltd.

2. M. Y. Rhee *Mobile Communication systems and security*. John Wiley & Sons Ltd.

CMP 475 Cloud Computing

Course Objectives
Cloud computing has become a great solution for providing a flexible, on-demand, and dynamically scalable computing infrastructure for many applications. Cloud computing also presents a significant technology trends, and it is already obvious that it is reshaping information technology processes and the IT marketplace. Thus objective of this course is to introduce the aspects of cloud computing issues.

Course Description
This course gives an introduction to cloud computing and its techniques. The topics covered include; introduction to cloud computing, cloud architecture, cloud service models, Service Oriented Architectures, Security in cloud computing, disaster management in clouds.

This course also covers a series of current cloud computing technologies, including technologies for Infrastructure as a Service, Platform as a Service, Software as a Service, and Physical Systems as a Service. For different layers of the cloud technologies, practical solutions such as Google, Amazon, Microsoft, SalesForce.com, etc. solutions as well as theoretical solutions (covered by a set of papers) are introduced.

Most of the course will be covered by the student presentations. The course is also highly project oriented, involving hand-on exploration of existing technologies as well as development of new technologies.

Course Outcomes
By the end of this course, students should be able to:
- To understand advanced concepts in theory of computer science.
- To understand advanced concepts in applications of computer science.
- To apply knowledge of advanced computer science to formulate and analyze problems in computing and solve them.
- To learn emerging concepts in theory and applications of computer science.
- To design and conduct experiments as well as to analyze and interpret data.
- To function in teams and to communicate effectively.

Course Contents

Unit I: Introduction   10 hours
Defining the Cloud, The Emergence of Cloud Computing, Cloud-Based Services, Grid Computing or Cloud Computing, Components of Cloud Computing, Cloud Computing Deployment Models: Public, Private, Hybrid, Benefits of Using a Cloud Model, The business case for going to the cloud

Unit II: Cloud Service Models   **11 hours**

Communication-as-a-Service (CaaS): Advantages of CaaS, Fully Integrated, Enterprise-Class Unified Communications, Infrastructure-as-a-Service (IaaS): Modern On-Demand Computing, Amazon's Elastic Cloud, Amazon EC2 Service Characteristics, Monitoring-as-a-Service (MaaS),

**Unit III: Cloud computing technology**   **13 hours**

Hardware and Infrastructure, Accessing the cloud, Cloud storage, Standards, Evolution from Managed service providers (MSP) to Cloud Computing, Single Purpose architecture to multi-purpose architectures, Data center virtualization, Cloud data center, Service Oriented Architectures (SOA), Combining and SOA, Characterizing SOA, Open Source Software in data centers

Unit IV: Cloud computing at work and security   **11 hours**

Software as service, Developing applications, Cloud Security Challenges, Software-as-a-Service Security: Security Management, Risk Management, Security Monitoring and Incident Response, Security Architecture Design, Vulnerability Assessment, Data Privacy and Security, Application Security, Virtual Machine Security, Disaster Recovery, Disasters in Cloud, Disaster Management

References

1. John W. Rittinghouse and James F. Ransome, *Cloud Computing: Implementation Management and Security.CRC* Press: *Taylor & Francis.*
2. George Reese, *Cloud Application Architecture*, O'Reilly Media.
3. Judith Hurwitz, Robin Bloor, Marcia, *Cloud Computing for Dummies,* Kaufman, Fern Halper.
4. BorkoFurht, Armando Escalante, *Handbook of Cloud Computing*, New York: Springer 2010.
5. David S. Linthicum, *Cloud Computing and SOA Convergence in your Enterprisea step by step guide.*
6. Anthony T. Velte Toby J. Velte, Ph.D. Robert Elsenpeter, *Cloud computing: A practical Approach.*
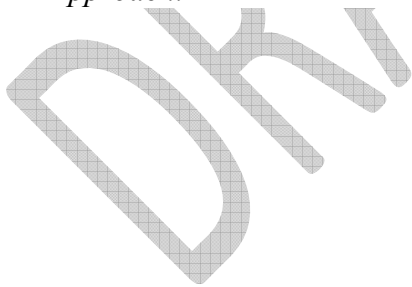
CMP 476 Distributed Database Management system

Course Objectives
This course introduces fundamental concepts and implementation of object oriented and distributed database systems with focus on data distribution, query processing, transaction processing, concurrency control and recovery.

Course Description
Design and development of distributed and Object oriented database systems

Course Contents

Unit I: Introduction to Distributed Database   12 hours
Distributed Data Processing, Concepts of Distributed   Database. Distributed vs. Centralized Database System; advantage and application. Transparency, performance and reliability, Problem areas of Distributed Database.   Integrity Constraints in Distributed databases. Distributed Database Architectures : DBMS standardization,   Architectural models for Distributed DBMS – autonomy, distribution and heterogeneity, Distributed   Database architecture – Client/Server , Peer – to – peer distributed systems, MDBMS Architecture, Distributed Catalog management. Distributed Database Design: Design strategies and issues. Data Replication. Data Fragmentation – Horizontal, Vertical and Mixed. Resource allocation. Semantic Data Control in Distributed DBMS.

Unit II: Distributed Query Processing   17 hours
Query Decomposition and Data localization for distributed data, join ordering, semi-join strategy, Distributed Query Optimization methods. Distributed Transaction Management: The concept and role of the transaction. Properties of transactions-Atomicity, Consistency, Isolation and Durability. Architectural aspects of Distributed Transaction, Transaction Serialization. Distributed Concurrency Control: Lock-based and Timestamp-based Concurrency Control methods. Optimistic method for Concurrency Control. Deadlock management – prevention, avoidance detection, and resolution. Non-serializable schedule and nested distributed transaction.

Reliability of Distributed DBMS and Recovery: Concept and measures of reliability, Failure analysis, types of failures. Distributed Reliability Protocols. Recovery techniques. Two Phase Commit, Presumed abort, Presumed commit. Three phase commit, Partitions, Scalability of Replication.

Unit III: Object Oriented Database Concept   16 hours
Data types and Object, Evolution of Object Oriented Concepts, Characteristics of Object Oriented Data Model. Object Hierarchies – Generalization, Specialization, Aggregation. Object Schema. Enter-object Relationships, Similarities and difference between Object Oriented Database model and Other Data models. OODBMS Architecture Approach: The Extended Relational Model Approach. Semantic Database Approach, Object Oriented Programming

Language Extension Approach, DBMS Generator Approach, the Object Definition Language and the Object Query Language. The Object Oriented DBMSArchitecture, Performance Issue in Object Oriented DBMS, Application Selection for Object Oriented DBMS, the Database Design for an Object Relational DBMS. The Structured Types and ADTs, Object identity, Extending the ER Model, Storage and Access Methods, Query Processing, Query Optimization, Data Access API (ODBC, DB Library, DAO, ADO, JDBC, OLEDB), Distributed Computing Concept in COM, COBRA.

Laboratory works: All distributed and Object Oriented database components mentioned in the course.
(Practical implementation in Oracle 9i or Oracle 10g covering both Distributed and Object Oriented Database Features)

References
1. Ozsu, M. Tamer and Patrick Valduriez, *Principles of Distributed Database Systems,* New York: Pearson Education.
2. *Object Oriented Database System – Approaches and Architectures;* C.S.R. Prabhu, PHI.
3. Silberschatz, Abraham, Henry F. Korth and S. Sudarshan: *Database System Concepts;* New Delhi: McGraw Hill International Edition.
4. Gerald V. Post: *Database Management System –* New York: McGraw Hill International Edition.
5. Peter Rob, Carlos Coronnel: *Database Systems – Design, Implementation and Management; Course Technology*. Australia: Ceneage Learning.
6. R. Cattel: *Object Data Management*. New York: Addison-Wesley.

CMP 477 Management of Technology

Course Objectives
Following the successful completion of this course, students will be expected to have
- A working understanding of the concepts and techniques of strategic technology Management;
- An ability to critically analyze the organizations and its environment in the developing, implementing, and managing technology from a strategic perspective;
- The capacity to critically evaluate the strategic management of technology

Course Description
Management of technology course attempts to assist the students in understanding the basic concepts and themes of technology and technology management and the importance of alignment of technology strategy with the strategy of a firm. The course also attempts to help students analyze the competitive environment and manage technology strategically.

This course offers an understanding of the management of technology and innovation, not in isolation, but as a dynamic integrated system connected to organizational culture, knowledge management and value creation. To enhance the understanding of the hypercompetitive industrial markets of the globe, the course contents technological innovation that can lead to wealth creation. In doing so, it weaves wealth creation with other seminal concepts of social capital, human capital and knowledge management.

Course Outcomes
At the completion of the course students will be able to:
- Examine, interpret and apply current emerging business concepts and philosophies in today's technological business environment;
- Illustrate conceptual, synthetic and analytical thinking skills relative to decision making, problem solving, leadership, motivation, human relations and technical applications;
- Analyze and practice hands-on projects, exercises and presentations that simulate real world circumstances as well as work experience in an internship that reinforces concepts and ideals in all business arenas;
- Manage work habits consistent with professional responsibility, ethics, laws, interpersonal communications and team building competencies;
- Demonstrate competencies with computer software applications; and
- Employ proficiencies in salesmanship, customer service, and training and development relative to different business philosophies and environments.

Course Contents
The contents in the courses keeps on updating in no time. This is the reason to highlight only the unit headings. Course instructor is responsible to include the latest developments and deliver it to the students without missing fundamentals of the course. The following themes or topics are included:

- Technology and its trends
- Technology in competitive environment
- Management of technology and innovation in business world
- Strategy for technology management
- Strategic management for development
- Technology transfer, Sourcing and acquiring Technology

Teaching Methods

The instructor must deliver keeping in mind that Technological Excellence provides a synoptic account of the diverse dimensions of technology management, from incremental innovation, integration of design and manufacture to technological innovation and creation of hybrid technologies. Instructor must provide an outline of the rationale of the strategic evaluation of investments in technology, and brings about its contrast with the conventional accounting framework of net present value (NPV) and discount cash flow (DCF) analyses.

Basic Text

P. N. Rastogi. *Management of Technology and Innovation*. New Delhi: Sage Publication India.

CMP 478 Geographic Information System

Course Objectives
This course offers an introduction to the concepts, principles, and theories behind Geographic Information Systems and Science (GIS), with emphasis on the nature of geographic information, data models and structures for storing geographic information, geographic data input, data manipulation, and simple spatial analysis and modeling techniques. The course is composed of two components: lectures and labs. The lectures will discuss the above theories and concepts and the labs will reinforce them through hands-on exercises and projects. Students must be clear that this is not a class on any specific GIS software. It is a course on the underpinning theory and concepts in GIS. However, students will be exposed to two major commercial GIS software packages (GeoMedia and ArcGIS) in their labs.

Course description
This course introduces the software components of a Geographic Information Systems and reviews GIS applications. Topics includesGeo-Web, data infrastructures and basic functions, methods of data capture and sources of data, and the nature and characteristics of spatial data and objects.

Course Outcomes
After successful completion of this course, the students will be able to:
- describe what GIS is; name the major GIS software available; know where to find more information;
- explain the components and functionality of a GIS and the differences between GIS and other information systems;
- understand the nature of geographic information and explain how it is stored in computer(including map projection) and the two types of GIS data structure;
- conduct simple spatial analysis using GIS software;
- design and complete a GIS project from start to finish (data capture, data storage and management, analysis, and presentation)

Course Contents

Unit I: Introduction and orientation to geographic world issues   4 hours
Course overview; teaching philosophy; logistic, Nature of geographic phenomenon; asking spatial questions. Human cognitive aspect of geographic world

Unit II: Introduction to Geographic Information System   4 hours
Definition and functional components of GIS, Evolution of GIS in relation to computational and communication technology, GIS application areas

Unit III: Geospatial Web 2.0 (i.e. GeoWeb)   **9 hours**
Introduction to Geospatial Web 2.0, Navigating Geospatial Web 2.0 communities and tools, Geographic information mash-up, Geospatial Web 2.0 and its societal applications, Challenges and opportunities of Geospatial Web 2.0

Unit IV: Fundamental concepts for GIS   **9 hours**
Modeling and representing geographic situation, GIS database design, Vector data model, Raster data model, Reference systems, Map and map scale, Spatial analysis and visualization

Unit V: Data acquisition techniques   **12 hours**
Introduction to primary and secondary spatial data capture techniques, Concepts of ground survey, Global positioning system (GPS), Overview of Remote sensing and its applications, Elements of remote sensing, Electromagnetic spectrum, Spectral reflectance characteristics, Satellite orbits , Satellite image resolutions, Major remote sensing systems and products

Unit VI: Spatial Data Infrastructure   **4 hours**
Conceptual overview, GI standards and interoperability, Initiative in Nepal and its status

Unit VII: Planning, building and managing GIS   **6 hours**
Identifying and preparing data source, Data capture and storage, Practical issues related to GIS implementation, Socio-technical view of GIS

Basic Text
C. P. Lo and Albert K. W. Yeung*Concepts and Techniques of Geographic Information Systems,*

References
1. Chang, K.T *Introduction to Geographic Information System,* McGrawHill 2010.
2. *Modelling our world: the ESRI guide to geodatabase design*, ESRI, California.
3. SDI Cookbook *http://www.ncgia.ucsb.edu/giscc/.*

CMP 479 Mobile Computing (Programming)

Course Objectives
The course is designed with following objectives to make students:
- Understand the Android OS architecture.
- Install and use appropriate tools for Android development, including IDE, device emulator, and profiling tools.
- Understand the Android application architecture, including the roles of the task stack, activities, and services.
- Build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
- Use advanced UI widgets for scrolling, tabbing, and layout control.
- Present menus via the Android action bar and handle menu selections.
- Store application data on the mobile device, in internal or external storage locations.
- Support user-specific preferences using the Android Preferences API.

Course Description
This course introduces mobile application development for the Android platform. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android applications, with particular emphasis on software engineering topics including software architecture, software process, usability, and deployment.

Course Outcomes
On successful completion of this module, a student should be able to develop Android applications.
In particular students will have a good:
- working knowledge of the development framework and be able to use its various features, including UI, resources, storage, security, multimedia, location, etc
- working knowledge of Android Studio, including debugging in emulator and real hardware
- design practices for mobile development, designing applications for performance and responsiveness
- knowledge to sign and publish developed applications

Course Contents

Unit I: Review of Java Programming   2 hours

Unit II: Getting Started with Android Programming   4 hours
Introduction to Android, Android Versions, Features of Android, Architecture of Android, Dalvik Virtual Machine, Obtaining the Required Tools, Android SDK, Android Studio and Android Development Tools (ADT), Creating Android Virtual Devices (AVDs) – Pros and

Cons of Emulator, Working with Emulator using telnet Command (Network, Power and SMS), Interacting with Multiple Emulator, Steps to Create Android Application, Android App Resources, The Main Activity File, The Strings File, The R File, The Layout File, The Manifest File, The Gradle File

Unit III: Activities, Fragments and Intents   10 hours
Understanding Activities, Introduction, Life Cycle of Activities, Creating an Activity, Declaring the Activity in the Manifest, Starting and Shutting Down the Activity, Android Task Backstack, Intents, Introduction, Types of Intents, Intent Objects , Intent Fields - ACTION, DATA, CATEGORY, TYPE, COMPONENT, EXTRAS and FLAGS, Intent Filters, Linking Activities Using Intents, Resolving Intent Filter Collision, Returning Results from Intent, Passing Data Using an Intent Object, Fragments, Introduction, Life Cycle of a Fragment, Adding Fragments Dynamically, Interactions between Fragments, Calling Built-In Applications Using Intents, Understanding Intent Object, Using Intent Filters, Adding Categories, Displaying Notifications, Understanding Permissions, Defining & Using Application Permissions, Component Permissions & Permissions Related APIs.

Unit IV: Android UI   5 hours
Understanding the Components of a Screen, Views and View Groups, Layouts (Linear, Absolute, Table, Relative, Frame and Scroll View), Adapting to Display Orientation, Anchoring Views, Resizing and Repositioning, Utilizing the Action Bar, Adding Action Items to the Action Bar, Customizing the Action Items and Application Icon

Unit V: Designing UI with Views   7 hours
Using Basic Views, Text View, Button, Image Button, Edit Text, Check Box, Toggle Button, Radio Button, Radio Groups, Progress Bar and Auto Complete Text View, Event Handling, Event Listeners and Handlers, Event Listeners Registration, Event Handling Examples, Event Listeners Registration Using an Anonymous Inner Class, Registration Using the Activity Implements Listener Interface, Registration Using Layout File, Using List View and Spinner View, Understanding Specialized Fragments, Using a List Fragment and Preference Fragment

Unit VI: Displaying Menus with Views   2 hours
Using Menus with Views, Creating the Helper Methods, Options Menu, Context Menu, Working with Web View

Unit VII: Data Persistence   5 hours
Saving and Loading User Preferences, Accessing Preferences Using an Activity, Persisting Data to Files, Saving to Internal and External Storage, Using Static Resources, Creating and Using Databases, Introduction to SQLite, Creating the Database Helper Class, CRUD Operation in SQLite

Unit VIII: Messaging   2 hours
SMS Messaging, Sending SMS Messages Programmatically, Sending SMS Messages Using Intent, Sending E-Mail

Unit IX: Networking   3 hours

Consuming Web Services Using HTTP, XML Parsing, JSON Parsing

Unit X: Developing Android Services   **4 hours**
Creating Your Own Services, Creating a Simple Service, Performing Tasks in a Service Asynchronously, Performing Repeated Tasks in a Service, Understanding Threading

Unit XI: Using Third Party Libraries   **3 hours**
 Examples like Picasso, Volley, GSON, Develop sample app using third party APIs

Unit XII: Deploying Android Apps in Play Store   **1 hour**

Basic Text
Lee, W. M. *Beginning Android 4 Application Development*. New York: WROX Publication.

References
1. Simon, J. *Head First Android Development*. O'Reilly Media.
2. Meier, Reto. *Professional Android 4 Application Development*. New York: WROX Publication.