

## Data Communication and Computer Network

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

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

### Course Contents:

- |   |              |
|---|--------------|
| <b>1 Background Study and Revision</b>  | <b>3 hrs</b> |
| 1.1 Introduction and necessity of computer networking,  |              |
| 1.2 Networks goals/ motivation,   |              |
| 1.3 Networks protocols, and networking model.   |              |
| 1.4 Application and use of networks   |              |
| <br>  |              |
| <b>2 Data Transmission</b>  | <b>3 hrs</b> |
| 2.1 Transmission terminology (Simplex, Duplex, Half Duplex)   |              |
| 2.2 Bandwidth and frequency   |              |
| 2.3 Serial and parallel communication   |              |
| 2.4 Analog and digital transmission   |              |
| 2.6 Transmission impairments (attenuation and delay distortion, concept of delay, noise)                                |              |
| 2.7 Asynchronous and synchronous transmission   |              |
| <br>  |              |
| <b>3 Multiplexing and Switching</b>   | <b>4 hrs</b> |
| 3.1 Multiplexing ( Frequency division multiplexing, synchronous time division multiplexing, time division multiplexing) |              |
| 3.2 Modems, modulation and its types (pulse, amplitude, frequency and phase)  |              |
| 3.3 Switching and its types   |              |
| <br>  |              |
| <b>4 Reference Model</b>  | <b>5 hrs</b> |
| 4.1 Protocol Layers: Introduction, layered architecture   |              |
| 4.2 The Internet protocol stack   |              |
| 4.3 network entities and layers   |              |
| 4.4 OSI reference Model   |              |



<b>5 Physical Layers and its Design Issues</b>	<b>3 hrs</b>
5.1 Bounded transmission media (Twisted Pair Cable, Co-axial: Base-band cable, Broad-band cable, fiber Optical).	
5.2 Unbounded transmission media (micro wave, satellite	
5.3 Introduction of ISDN and PSTN	
<b>6 Data Link Layer</b>	<b>7 hrs</b>
6.1 Framing	
6.2 Basics of error detection and correction,	
6.3 Cyclic redundancy Check code for error detection,	
6.4 Flow control	
6.5 Retransmission strategies (stop-&-wait ARQ, GO-Back-NARQ, Selective Repeat ARQ, and Pipelining)	
6.6 Sliding window protocols.	
<b>7 TCP/IP Reference Model</b>	<b>9 hrs</b>
7.1 Introduction of TCP/IP Model	
7.2 IPV4 frame Format	
7.3 IP Addresses and class, Subnet class	
7.4 Subnet calculation ,masking	
7.5 Introduction of IPV6	
7.6 Internet multicasting	
7.7 mobile IP	
7.8 Comparison with OSI Reference Model	
<b>8 Network Layer and Internet Layer</b>	<b>6 hrs</b>
8.1 Network layer and design Issues	
8.2 virtual Circuit and Data grams	
8.3 Introduction of Routing :( Shortest Path Routing Algorithm, Flow Based Routing Algorithm, Distance Vector Routing Algorithm),	
8.4 Congestion Control and Leaky Bucket Algorithms	
<b>9 Network Servers</b>	<b>5 hrs</b>
9.1 Servers (HTTP, DHCP, SMTP, DNS, PROXY, FTP)	
9.2 Examples of client and servers tools	
<b>10 VPN and Network Security</b>	<b>3 hrs</b>
10.1 VPN (Virtual private Networks)	
10.2 cryptography (symmetric key algorithms, public key algorithm)	
10.3 Communication security and web security	



## **Laboratory Work**

### **List of Practicals:**

1. LAN cabling
2. networks utilities (telnet, netstat, ipconfig, ping, arp, tracert, netview)
3. Computer Networking on Windows Based Platform
4. Installation and Configuration of Different Types of servers
  - a. DHCP Server
  - b. DNS server
  - c. Web server
  - d. Print Server
5. Networking with Unix
6. Network Security and Policies

### **Text Books:**

1. Neil Jenkins and Stan Schatt: *Understanding Local Area Networks*, PHI
2. Andrew S. Tanenbaum: *Computer Networks*, PHI



**Applied Economics**  
BCA, Third Year, Sixth Semester

**Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

**Course Objective:**

The main objective of this course is to impart the fundamental concept of micro and macro economic theory. It aims to enhance the skill of the students in analysis and interpretation of the economic concept with respect to business decision.

**Course Contents:**

- |  |              |
|--|--------------|
| <b>1. Introduction</b>   | <b>3 hrs</b> |
| 1.1 Concept of Micro Economics and Macro Economics   |              |
| 1.2 Measurement of Inequality  |              |
| 1.3 Equilibrium, Statics and Dynamics, Stock and Flow ratio variables  |              |
| <b>2. Theory of Consumer Demand</b>  | <b>6 hrs</b> |
| 2.1 Ordinal Approach (Indifference Curve Analysis)   |              |
| 2.2 Consumer equilibrium, price, income and substitution effect  |              |
| 2.3 Price elasticity of demand and its determinants; Income and Cross elasticity of demand; Price and cross elasticity of supply |              |
| 2.4 Economics of Speculation   |              |
| <b>3. Analysis of Cost and Revenue</b>   | <b>5 hrs</b> |
| 3.1 Nature and types of cost curves (traditional as well as modern), relationship among total, average and marginal cost curves  |              |
| 3.2 Nature and types of revenue curves, relationship among total, average and marginal revenue curves                            |              |
| <b>4. Theory of Production</b>   | <b>4 hrs</b> |
| 4.1 Producer's equilibrium in long run ( In terms of minimization of cost and maximization of output)                            |              |
| 4.2 Cobb-Douglas Production Function   |              |
| <b>5. Product Pricing</b>  | <b>6 hrs</b> |
| 5.1 Concept of market equilibrium, concept of firm's equilibrium, tax and subsidy upon market equilibrium and price              |              |
| 5.2 Linear programming   |              |
| 5.3 Cost Benefit method  |              |
| <b>6. Factor pricing</b>   | <b>3 hrs</b> |
| Modern theory of factor pricing (Demand and Supply Theory)   |              |
| <b>7. National Income</b>  | <b>2 hrs</b> |
| Methods and difficulties of measurement National Income  |              |



## **Text Books:**

1. Mankiew , N.G.: *Principles of Microeconomics*, Harcourt Brace College Publishers
  2. Sampat Mukherjee: Modern Economic Theory; Wishwa Prakashan, (A Division of Wiley Eastern Ltd.), New Delhi.
  3. Mankiew , N.G.: *Macroeconomics*, New York: Worth Publisher

### **References:**

1. D.N. Dwivedi: *Microeconomics Theory and Applications*, Pearson.
  2. Dominick Salvatore: *Theory and Problems of Microeconomics*, Schaum's outline series McGraw hill Inc, Singapore.



## **Organization Management (3 – 0 - 0)**

### **Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### **Course Objectives:**

This course enables the students to achieve the management skills at professional level and to achieve the goal of organization through it with the help of use of technology.

### **Course Contents:**

- |   |              |
|---|--------------|
| <b>1. Introduction</b>  | <b>8 hrs</b> |
| 1.1 Concept of management   |              |
| 1.2 Functions of management   |              |
| 1.3 Levels of management  |              |
| 1.4 Scope and application of management   |              |
| 1.5 Concept of organization   |              |
| 1.6 Characteristics of organization   |              |
| 1.7 Culture of organization   |              |
| 1.8 Formal and informal organizations   |              |
| 1.9 Organization chart  |              |
| 1.10 Types of organization-line: Line and staff, Functional and matrix  |              |
| 1.11 Authority and responsibility and their interrelationships.   |              |
| 1.12 Relationship between organization and management   |              |
| <b>2. Motivation</b>  | <b>8 hrs</b> |
| 2.1 Concept of motivation   |              |
| 2.2 Need of motivation  |              |
| 2.3 Financial and non financial motivation  |              |
| 2.4 Theories of motivation: Maslow Need hierarchy; Alderfer's ERG theory, McClelland's theory of learned needs, McGregor theory X and Y |              |
| 2.5 Contemporary issues of motivation in Nepalese organization  |              |
| 2.6 Application of case   |              |
| <b>3. Leadership</b>  | <b>9 hrs</b> |
| 3.1 Concept of leadership   |              |
| 3.2 Need and importance of leadership   |              |
| 3.3 Qualities of effective leadership   |              |
| 3.4 Theory of leadership: trait theory, behavioral theory, transactional theory, transformational theory, charismatic theory            |              |
| 3.5 Leadership styles: Participative management, Management by objectives, management by exception.                                     |              |
| 3.6 Contemporary issue of leadership in Nepali organizations  |              |
| 3.7 Application of case   |              |
| <b>4. Introduction to Industrial Relations</b>  | <b>9 hrs</b> |
| 4.1 Meaning and nature of Industrial Relations  |              |



- 4.2 Objective of IR
- 4.3 Concept of grievance
- 4.4 Causes and settlement of grievances
- 4.5 Grievance settlement process in Nepal
- 4.6 Trade union
  - 4.6.1 Collective bargaining
  - 4.6.2 Trade union movement in Nepal
- 4.7 Employee discipline
- 4.8 Causes and settlement of disciplinary problem
- 4.9 Employee health and safety
- 4.10 Challenges of industrial relations in Nepal
- 4.11 Application of case

**5. Contemporary issues in organizational management** **14 hrs**

- 5.1 Human Resource Management
  - 5.1.1 Meaning and function of HR
  - 5.1.2 Job Analysis and Job Description
  - 5.1.3 Recruitment and Promotion
  - 5.1.4 Performance Appraisal
  - 5.1.5 Compensation management
  - 5.1.6 Training and development
  - 5.1.7 Role of HR professional in changing Environment
- 5.2 Globalization
  - 5.2.1 Introduction to Globalization
  - 5.2.2 Globalization and its effects to management and leadership
- 5.3 Corporate Social Responsibility
  - 5.3.1 Ethical Issue
  - 5.3.2 Issues on Employment Practices
  - 5.3.3 Human Rights
  - 5.3.4 Environmental Regulations
  - 5.3.5 Corruption
- 5.4 Conflict Management
  - 5.4.1 Conflicts and its sources
  - 5.4.2 Issues on settling conflicts
  - 5.4.3 Negotiation and Facilitation
  - 5.4.4 Mediation
  - 5.4.5 Arbitration
  - 5.4.6 Legal Action

**References:**

1. Harold Koontz and Heinz Weirich: Essentials of Management
2. Goodinda Ram Agrawal: Organization and Management in Nepal.
3. C.B. Mamoria: Personnel Management
4. Fred Luthan: Organizational Behavior, McGraw Hill



## Fundamentals of Probability and Statistics (3 – 0 – 0)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

This course aims to provide students with a thorough understanding of descriptive and inferential statistical tools used in decision making.

### Course Contents:

<b>1. Introduction</b>	<b>3 hrs</b>
1.1 Statistics and data	
1.2 quantitative and categorical variables	
1.3 fundamental elements of a statistical analysis	
<b>2. Data collection</b>	<b>4 hrs</b>
2.1 Sources of data	
2.2 experimental research	
2.3 survey research	
2.4 questionnaire	
2.5 data preparation - editing, coding, and transcribing	
<b>3. Tables and Charts</b>	<b>4 hrs</b>
3.1 Steam-and-leaf display	
3.2 frequency distribution	
3.3 relative frequency distribution	
3.4 cumulative polygon	
3.5 time-plots	
<b>4. Summarizing and Describing Numerical Data</b>	<b>5 hrs</b>
4.1 Measure of central tendency: mean, median, mode and mid-hinge	
4.2 Measures of variation: range, inter quartile range, standard deviations, and coefficient of variations.	
4.3 Shape	
4.4 five-number summary and box-and-whisker plot	
<b>5. Probability</b>	<b>5 hrs</b>
5.1 Basic concepts	
5.2 counting rules	
5.3 objective and subjective probability	
5.4 marginal and joint probability	
5.5 addition rule	
5.6 conditional probability	
5.7 multiplication rules	



## 5.8 Bayes' Theorem

<b>6. Discrete Probability Distribution</b>	<b>5 hrs</b>
6.1 Random variables	
6.2 mean and standard deviation of discrete random variables	
6.3 mathematical expectation	
6.4 binomial distribution	
6.5 Poisson distribution	
<b>7. Continuous Probability Distribution</b>	<b>5 hrs</b>
7.1 Normal distribution and its applications	
7.2 assessing normality	
7.3 normal approximation of binomial and Poisson distribution	
<b>8. Estimation of Population Parameters</b>	<b>5 hrs</b>
8.1 Law of large numbers	
8.2 central limit theorem	
8.3 statistical confidence	
8.4 confidence intervals	
8.5 confidence for means and populations	
<b>9. Hypothesis Testing</b>	<b>6 hrs</b>
9.1 Testing of significance	
9.2 p-value approach to hypothesis testing	
9.3 connection between confidence intervals and hypothesis testing	
9.4 comparing two means (two sample z and t- test procedures)	
9.5 comparing two proportions	
<b>10. Correlation and Regression Analysis</b>	<b>6 hrs</b>
10.1 Correlation Coefficient	
10.2 Properties	
10.3 Simple Linear Regression Model	
10.4 Residual Analysis	
10.5 Coefficient of Determination	
10.6 Standard Error	

### Text Books:

1. Levin, Richard I. And David S. Rubin: *Statistics for Management*, Prentice-Hall of India
2. Berenson, Mark L. and David M. Levine: *Business Statistics: Concepts and Applications*, Prentice-Hall, Inc



## **Project III**

BCA, Third Year, Sixth Semester

### **Course Objectives:**

The goal of the project work is to provide the students an opportunity to experience the demands and solving real-world problems. During the course, students have to design and complete a functional project which should require integration of various course concepts based on any of the computer core areas covered in the syllabus or from the management areas subject to the approval of Project Committee. Students will develop various skills related to project management like team work, resource management, documentation and time management to develop effective and efficient software.

### **Project work need to be conducted based on following guidelines:**

#### **1. Group formation (Not exceeding 4 persons per group)**

#### **2. Proposal Defense**

The first stage is worth 10% of the grade and the grading shall be based on the following:

- ✓ Specification (Define the Problem)
- ✓ Project plan (Draw up a project plan identifying the different components)
- ✓ The overall budget.

#### **3. Development Stage (Work performed)**

The second stage is worth 50% of the overall grade which is evaluated as follows:

- ✓ System design (if applicable)
- ✓ Thoroughness of the work done
- ✓ Familiarity with other work in the field.
- ✓ Ability to critically evaluate work of others.
- ✓ Understanding of methods used in the project
- ✓ Amount of work performed
- ✓ Significance of the work performed
- ✓ Level of achievement with respect to the degree of difficulty
- ✓ Correctness
- ✓ Ability to identify problem areas and suggest appropriate solutions
- ✓ Ability to work with others
- ✓ Project management skills

#### **4. Reporting Stage**

##### **a. Documentation (20%)**

This criterion evaluates the final document presented. This includes the final project report including journals of the student's experiences during the project, the programmer's manual, the user's manual, the source code listings, and data used for program verification, validation and output. It consists of 20% of the total marks. In particular, the following points are evaluated:

- ✓ Report organization (systematic and logical)
- ✓ Text formatting style (clarity and conciseness)



- ✓ Completeness of the report
- ✓ Readability of manuals
- ✓ Readability of programs
- ✓ Organization and analysis of data and output

**b. Presentation 20%**

At the end of the semester the students will have to give a presentation. The students must present their work in the presence of external examiners (all students must attend all presentations). This criterion evaluates the ability of student in presenting his/her work to other people. It consists of 20% of the total marks. In particular, the following points are evaluated:

- ✓ Organization and smartness of appearance of presenters
- ✓ Delivery
- ✓ Clarity
- ✓ Content
- ✓ Ability to answer questions
- ✓ Demonstration of the system
- ✓ Application of audio-visual aids



**Web Technologies II (3-0-3)**  
**BCA, Third Year, Sixth Semester**

**Evaluation:**

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

**Course Objectives:**

The student would be able

1. To expose the students with client and server side web programming.
2. To know flexible but powerful languages for developing dynamic web pages.
3. To get practical knowledge of server side scripting languages like Servlet, JSP and PHP.
4. To help the students to understand the concept of HTML, Servlet, JSP and PHP.

<b>1 Web Essentials: Clients, Servers, and Communication</b>	<b>4 hrs</b>
<b>1.1 Review of Web Technologies I</b>	
Basic internet protocols, HTTP request message, HTTP response message, web clients, web servers	
1.2 Different architectures of connection	
1.3 Client side Vs server side scripting language	
<b>2 Web-based scripting using PHP</b>	<b>12 hrs</b>
<b>2.1 Introduction to PHP</b>	
Installation of Web Server, PHP Server Configurations; PHP MyAdmin, Writing simple PHP program, Arrays, Control statements, loops, User defined functions (with argument and return values), global variable ,URL encoding, HTML Encoding	
<b>2.2 PHP and Database connectivity</b>	
Need for database, php supported database, Introduction to MySQL, CRUD - select statements, creating database/tables, inserting values, updating and deleting	
<b>2.3 File handling in PHP</b>	
Reading and writing from and to FILE, file system and directory functions	
<b>2.4 More features of PHP</b>	
Working with cookies and sessions, Sending email in php	
<b>3 Java for Server Side Programming</b>	<b>12 hrs</b>
<b>3.1 Java Servlets</b>	
Servlet architecture, servlet lifecycle, parameter data, session, cookies, url rewriting, data storage	
<b>3.2 JSP technology</b>	
Introduction to JSP, JSP and servlet, Database Access, Database Programming using JDBC Studying Javax.sql.* package, Accessing a Database from a JSP Page	
<b>4 Web-based frameworks</b>	<b>6 hrs</b>
4.1 Content Management Systems	
4.2 Web-programming frameworks	
4.2.1 Introduction to general web programming frameworks	
4.2.2 Java frameworks	



#### 4.2.3 PHP frame work

<b>5 Web Services</b>	<b>4 hrs</b>
5.1 Introduction to web services and service-oriented architecture	
<b>5.2 SOAP</b>	
SOAP elements, RPC representation, SOAP encoding of struct data	
5.3 WSDL	
5.4 Concept of UDDI	
5.5 RESTful web services	
<b>6 Security in web applications</b>	<b>7 hrs</b>
<b>4.1 Web application security fundamentals</b>	
Foundations of security, threats, vulnerabilities, attacks, security principles	
<b>4.2 Threats and countermeasures</b>	
Anatomy of attack, network threats and countermeasures, host threats and countermeasures, application threats and countermeasures, configuration managements	
<b>4.3 Design guidelines for secure web applications</b>	
Architecture and design issues for web applications, deployment considerations, input validations, authentication, authorization, configuration management, sensitive data, session management, cryptography, parameter manipulation, exception management, auditing and logging	

#### List of Practical:

1. Demonstrate use of variables, operators, conditional statements and looping constructs.
2. Demonstrate use of array
3. Design a web page with controls like text box, radio button, check box, combo box etc, and check field data and their validity.
4. Demonstrate reading and writing to a text file.
5. Design a web page which will help user to send an enquiry to site admin email account. (Hint: take users email id, subject, and body in suitable controls and a button).
6. Design a web page to develop applications using back-end tools

#### Text Books:

1. Jeffry C. Jackson-Web Technologies: A computer Science Perspective, Pearson
2. Steve Suehring, Tim Converse and Joyce park -PHP 6 and Mysql

#### References:

1. B M Harwani -Developing Web Applications in PHP and AJAX, McGraw Hill
2. Mark Curphey, Joel Scambray, Erik Olson and Michel Howard-Improving Web Application Security Threats and Countermeasures, Microsoft
3. N. P. Gopalan, J Aklandeswari- Web Technology: A Developer's Perspective, PHI
4. Uttam K. Roy- Web Technologies, Oxford University Press
5. Kognet Learning solution -Web Technologies Black Book, Dream tech publication

