

Purbanchal University
Bachelor in Information Technology (BIT)

Year: III

Semester: V

S.N	Course Code	Course description	Credits	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Total (Hrs)
1	BIT303SH	Probability & Statistics	3	3	1	1	5
2	BIT307SH	Society & Ethics in IT	2	2	1	-	3
3	BIT372CO	Data Communication	2	2	1	2	5
4	BIT374CO	Web Technology - II	3	3	-	3	6
5	BIT375CO	Computer Graphics	3	3	1	2	6
6	BIT377CO	Operating System	3	3	1	2	6
7	BIT378CO	Project - V	2	-	-	3	3
		Total	18	16	5	13	34

Probability & Statistics

BIT303SH

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	1	1	20	25	80	-	125

Course Objective

After the completion of the subject, students are expected to be able to: (i) assemble data, (ii) analyze data and (iii) determine central tendency, distribution and make viable conclusion for decision making.

1. Nature and scope of statistics [2 Hrs]

- 1.1 Definitions of statistics
- 1.2 Descriptive and inferential statistics
- 1.3 Scope of statistics
- 1.4 Limitations and distrusters of statistics

2. Data and its collection [2 Hrs]

- 2.1 Primary and secondary data
- 2.2 Sources of primary and secondary data
- 2.3 Methods of data collection: census method, sample method
- 2.4 Compilation of administrative records

3. Classification and tabulation of data [2 Hrs]

- 3.1 Classification procedure: qualitative and quantitative classification
- 3.2 Tabulation of data

4. Diagrammatic and graphic presentation of data [3 Hrs]

- 4.1 Importance and limitations
- 4.2 Types of diagrammatic representations: bar diagram, pie diagram; pictogram
- 4.3 Types of graphic representations: histogram, frequency polygon, frequency curve, cumulative frequency curve (Ogive)

5. Measures of central tendency [4 Hrs]

- 5.1 Arithmetic mean
- 5.2 Geometric mean

- 5.3 Harmonic mean
- 5.4 The median: quartiles; deciles and percentiles
- 5.5 The mode
- 5.6 Relation between mean, median and mode

6. Measures of dispersion

[4 Hrs]

- 6.1 Absolute and relative measures
- 6.2 The range
- 6.3 Inter-quartile range
- 6.4 Quartile deviation
- 6.5 Mean deviation
- 6.6 Standard deviation
- 6.7 Coefficient of variation
- 6.8 Skewness and Kurtosis

7. Probability

[6 Hrs]

- 7.1 Preliminaries
- 7.2 Classical, empirical, axiomatic approaches of probability theory
- 7.3 Conditional probability
- 7.4 Inverse probability
- 7.5 Probability distribution
- 7.6 Mathematical expectation
- 7.7 Variance of random variable

8. Theoretical distribution

[7 Hrs]

- 8.1 Introduction
- 8.2 Binomial distribution and its chief features (without proofs)
- 8.3 Fitting a binomial distribution
- 8.4 Poisson distribution and its chief features (without proofs)
- 8.5 Fitting Poisson distribution
- 8.6 Normal distribution and its chief features
- 8.7 Areas under normal distribution
- 8.8 Hyper-geometric distribution

9. Estimation theory and testing of hypothesis

[7 Hrs]

- 9.1 Idea of sample and population
- 9.2 Point estimation and interval estimation
- 9.3 Characteristics of a good estimator
- 9.4 Interval estimation of population parameters
- 9.5 Sampling distribution and standard error

- 9.6 Sampling of attribute
- 9.7 Test of significance for single proportion
- 9.8 Test of significance for difference between two proportions
- 9.9 Sampling of variables
- 9.10 Large samples test
- 9.11 Test of significance for single mean
- 9.12 Test of significance for difference between two means
- 9.13 Small sample test
- 9.14 Student's T-distribution and its applications

10. Chi-Square distribution

[3 Hrs]

- 10.1 Introduction
- 10.2 Application
- 10.3 Test of goodness of fit
- 10.4 Test of independence of attributes

11. Correlation and regression analysis

[5 Hrs]

- 11.1 Introduction
- 11.2 Correlation analysis
- 11.3 Various methods of calculating correlation coefficient
- 11.4 Regression analysis

Laboratory: There shall be 12 lab exercises covering all the features of statistical analysis based on SPSS or any other statistical software packages.

References:

- Sukhminder Singh Et. Al., *"Statistical Method for Research Workers"*, Kalyani Publishers, New Delhi
- B. M. Clarke & D. Cooke, *"A Basic Course in Statistics"*, Elbs. (UK)
- B. L. Agrawal, *"Basic Statistics"*, Wiley Eastern
- Minimum & Clarke, *"Elements of Statistical Reasoning"*, Johnwiley & Sons
- Levin, *"Statistics for Management"*, Prentice Hall of India
- S. C. Gupta, *"Fundamentals of Statistics"*.

Questions format

Questions type	Number of questions	Total marks	Chapters
Long questions	2 questions out of 3	2 x 12 = 24	All chapters
Short questions	7 questions out of 8 or 9	7 x 8 = 56	All chapters

Society & Ethics in IT

BIT307SH

Year III

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Teaching Schedule Hours/ Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
2	1	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course Objective

The basic objective of this course is to provide fundamental knowledge on the concept of sociology and to understand social, cultural, economic, political and technical aspects. The purpose is to enable them to apply those basic concepts in addressing the significant issues inherent in Nepalese society and culture.

Unit 1: Introduction

[3 Hrs]

- 1.1 Definition and evolution of sociology
- 1.2 Relationship of sociology with economics, political science and computer science
- 1.3 Applications of sociology

Unit 2: Social and cultural change

[7 Hrs]

- 2.1 Process
- 2.2 Theories of social change (evolution, functional, conflict)
- 2.3 Factors of social change (economics, technology, education, demography)
- 2.4 Role of media and communication in social and cultural change
- 2.5 Innovation and diffusion
- 2.6 Resistance of social change
- 2.7 Technological changes and its consequences

Unit 3: Understanding development

[5 Hrs]

- 3.1 Definition and approaches of development
- 3.2 Indicators of development
- 3.3 Features of developing countries
- 3.4 Development planning
- 3.5 Role of national and international community and state

Unit 4: Process of transformation

[5 Hrs]

- 4.1 Modernization, globalization and migration

4.2 E-governance

4.3 E-commerce

Unit 5: Characteristics of Nepali society and culture

[6 Hrs]

5.1 Historical development of Nepal

5.2 Demography composition

5.3 Issue of gender

5.4 Caste and ethnic group

5.5 National integration and differentiation

5.6 Social stratification, problems and control

Unit 6: Ethical issues in IT

[5 Hrs]

6.1 Definition of profession

6.2 Profession ethics

6.3 code of conduct

6.4 Ethical dilemma and problems

6.5 Disciplinary action

6.6 Corporate social responsibility

Reference Books

- Alex Inkles, *“What is Sociology? Introduction in the Discipline & Profession”*, Prentice Hall of India
- G. M. Foster, *“Traditional Culture & Impact of Technological Change”*
- Rishikeshav Raj Regmi, *“Dimension of Nepali Society and Culture”*.
- C.N.S. Rao, *“Principle of Sociology with an Introduction of Social Thought”*, S. Chand & Co. Ltd.
- Pratley Peter, *“The Essence of Business Ethics”*, Prentice Hall of India, New Delhi
- A .Giddens & D. Mitchell, *“Introduction to Sociology”*, 3rd Ed., London, W.W. Norton & company

Questions format

Questions type	Number of questions	Total marks	Chapters
Long questions	2 questions out of 3	2 x 12 = 24	All chapters
Short questions	7 questions out of 8 or 9	7 x 8 = 56	All chapters

Data Communication

BIT372CO

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
2	1	2	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course Objective

The main objective of this course is to provide the fundamental knowledge of data communication and various concepts.

1. **Data communication** [1 Hr]
 - 1.1 Introduction
 - 1.2 Data communication model
 - 1.3 Standards related to data communication
 - 1.4 Key element of protocol
 - 1.5 TCP/IP protocol architecture
 - 1.6 OSI model
2. **Data transmission** [2 Hrs]
 - 2.1 Concept and terminology
 - 2.2 Analog and digital transmission
 - 2.3 Transmission impairment
 - 2.4 Wireless propagation
 - 2.5 Line of straight transmission
3. **Signal encoding techniques** [4 Hrs]
 - 3.1 Digital data, digital signal
 - 3.2 Digital data, analog signal
 - 3.3 Analog data, digital signal
 - 3.4 Analog data, analog signal
4. **Digital data communication techniques** [3 Hrs]
 - 4.1 Asynchronous and synchronous transmission
 - 4.2 Type of error

4.3 Error detection and correction method	
4.4 Line configuration	
4.5 Interfacing	
5. Data link control	[3 hrs]
5.1 Flow control	
5.2 Error control	
5.3 HDLC	
6. Multiplexing	[3 Hrs]
6.1 FDM, TDM, STDM, ADSL	
7. Switching	[3 Hrs]
7.1 Circuit-switching and packet-switching	
7.2 Switched communication network	
7.3 Circuit switching concept	
7.4 Packet switching principles and technique	
8. Congestion	[2 Hrs]
8.1 Congestion control in data network	
8.2 Effect of congestion	
8.3 Congestion control in packet switched network	
9. Cellular wireless network	[2 Hrs]
9.1 Principle of cellular network	
9.2 First generation analog	
9.3 Second generation CDMA	
10. LAN overview	[3 Hrs]
10.1 LAN protocol architecture	
10.2 Bridge	
10.3 Layer 2 and layer 3 switch	
10.4 Ethernet	
10.5 Fiber channel	
10.6 Wireless LAN technology	
10.7 IEEE 802.11	
11. Inter network protocol	[2 Hrs]
11.1 Internet protocol, ipv4 and ipv6	

11.2 VPN and IP security

11.3 Routing protocol

11.4 Multicasting

12. Data modems

[2 hrs]

12.1 Concept of modulation

12.2 AM, FM, PM

12.3 FSK, PSK, ASK

Laboratories: There shall be lab exercises covering the applicable chapter using software or communication devices.

Reference books:

- William Stallings, *"Data & Computer Communication"*.
- Behrouz A. Forouzan, *"Data Communication & Networking"*

Questions format

Questions type	Number of questions	Total marks	Chapters
Long questions	2 questions out of 3	2 x 12 = 24	All chapters
Short questions	6 questions out of 7 or 8	6 x 6 = 36	All chapters

Web Technology - II

BIT374CO

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	-	3	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective

The main objective of this course is to provide the advance concepts of web applications and server side programming.

Unit 1: XML, AJAX and Web services

[10 Hrs]

- 1.1 Introduction to XML
- 1.2 XML validation with DTD & schema
- 1.3 XSL and XSLT
- 1.4 XML processing with PHP
- 1.5 Asynchronous JavaScript and XML (AJAX)

Unit 2: Server side programming basics

[4 Hrs]

- 2.1 Introduction to server side programming
- 2.2 PHP basics
- 2.3 Embedding PHP scripts
- 2.4 Basic syntax (variables, operators, expressions, constants)

Unit 3: Server side programming with PHP

[12 Hrs]

- 3.1 Control structures
- 3.2 PHP functions
- 3.3 Recursion
- 3.4 String manipulation
- 3.5 Using regular expression
- 3.6 Exceptional handling with PHP

Unit 4: Database connectivity in PHP

[8 Hrs]

- 4.1 Introduction to SQL
- 4.2 Basic SQL commands (CRUD)
- 4.3 HTML forms and methods

- 4.4 Database connectivity
- 4.5 MySQL functions
- 4.6 Executing DDL and DML queries using PHP
- 4.7 Login and authentication
- 4.8 Session and cookies

Unit 5: Object-oriented PHP

[4 Hrs]

- 5.1 Review of object-oriented programming
- 5.2 Classes, objects and operations in PHP
- 5.3 Access modifiers: private, public and protected
- 5.4 Implementing inheritance

Unit 6: Responsive websites and advanced server side issues

[4 Hrs]

- 6.1 Responsive website strategies and design
- 6.2 Smart device functionality
- 6.3 Testing and debugging
- 6.4 Overview to advance server side issues
- 6.5 MVC framework (code igniter)

Unit 7: Semantic web

[3 Hrs]

- 7.1 Introduction to semantic web
- 7.2 Resource description framework (RDF)
- 7.3 Web ontology language (OWL)

Laboratories: There shall be lab exercises covering all features of above chapters.

Reference books:

- David Hunter, *“Beginning XML”*, Wrox Publication
- Robin Nixon, *“Learning PHP, MySQL & JavaScript”*, O’Reilly Media
- Rasmus Lerdorf, Kevin Tatroe & Peter MacIntyre, *“Programming PHP”*, O’Reilly Media
- Deitel, Deitel, Goldberg, *“Internet & World Wide Web How to Program”*, Pearson Education
- Paul S. Wang, *“Dynamic Web Programming & HTML 5”*, Chapman & Hall/CRC
- Rahul Banerjee, *“Internetworking Technologies”*, PHI Ltd
- Charles Ashbacher, *“SAMS Teach Yourself if XML in 24 Hours”*.

Questions format

Questions type	Number of questions	Total marks	Chapters
Long questions	2 questions out of 3	2 x 12 = 24	All chapters
Short questions	7 questions out of 8 or 9	7 x 8= 56	All chapters

Computer Graphics

BIT375CO

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective

The main objective of this course is to provide the basic techniques used in computer graphics system.

1. Introduction

[2 Hrs]

- 1.1 History of computer graphics
- 1.2 Application of computer graphics

2. Graphics hardware

[5 Hrs]

- 2.1 Keyboard, mouse (mechanical & optical), light pen, touch screen, tablet input hardware, joystick
- 2.2 Raster and vector display architecture
- 2.3 Architecture of graphical display terminals including frame buffer and color manipulation techniques RGB, CMYK

3. Two dimensional algorithms

[8 Hrs]

- 3.1 Direct and incremental line drawing algorithms
- 3.2 Bresenham's line drawing algorithms for positive and negative slopes (DDA algorithm)
- 3.3 Mid-point circle drawing and mid-point ellipse-drawing algorithms

4. Two-dimensional transformations

[10 Hrs]

- 4.1 Introduction to transformation
- 4.2 Two-dimensional translation, scaling and rotation
- 4.3 Successive and composite transformations
- 4.4 Pivot-point rotation and fixed-point scaling
- 4.5 Reflection and shearing
- 4.6 Viewing transformation and windows-to-viewport transformation
- 4.7 Clipping (The Cohen-Sutherland line-clipping algorithm, The Sutherland-Hodgman polygon clipping algorithm)

5. Three-dimensional graphics

[12 Hrs]

5.1 Projection (parallel and perspective)

5.2 3D transformations

5.2.1 Translation, scaling, reflection

5.2.2 Rotation (about axis, line parallel to coordinate axis, and line not parallel to coordinate axis)

5.2.3 Windows to viewpoint transformation

5.3 Hidden line and Hidden surface removal techniques (back face detection, Z-buffer, A-buffer, scan-line)

5.4 Introduction to non-planar surfaces (Bezier, Splines)

6. Light, color and shading

[5 Hrs]

6.1 Introduction

6.2 Need for shading in engineering data visualization

6.3 Algorithms to stimulate ambient, diffuse and specular reflections

6.4 Constants, gouraud and phong-shading models

7. Graphical languages

[2 Hrs]

7.1 Need for machine independent graphical languages (PHIGS, GKS)

7.2 Discussion of available languages and file formats (graphical file format)

8. Introduction to animation

[1 Hr]

8.1 Introduction to open GL

8.2 Application & today's trends

Laboratories:

1. Introduction to graphics primitive and graphics drivers

2. Implementation of line drawing algorithms

2.1 DDA

2.2 Bresenham's algorithm

2.3 Bresenham's general algorithm

3. Implementation of mid-point circle algorithm

4. Implementation of mid-point ellipse algorithm

5. Implementation of basic 2D and 3D transformation

6. Implementation of windows-to-viewport transformation

7. Implementation of line-clipping process

Reference books

- D. Harn & M.P. Baker, "Computer Graphics", PHI Edition
 - T. I. James, D. Foley, A. Van Dam, S. K. Feiner & J. F. Hughes, "Computer Graphics, Principles and Practice", PHI Edition
- Questions format**

Operating System

BIT377CO

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective

To provide fundamental concepts of operating system and its design.

1. Introduction

[3 Hrs]

- 1.1 Operating system as an extended machine & resource manager
- 1.2 History and types of operating system
- 1.3 Operating system concepts, functions, structures

2. Processes and threats

[9 Hrs]

- 2.1 Introduction
- 2.2 Process model, process states, process control block
- 2.3 Introduction to threads, kernel and user implementation of threads
- 2.4 Inter-process communication (multiprocessing, parallel processing, critical sections, race condition, mutual exclusion with busy waiting, semaphores, monitors)
- 2.5 Preemptive scheduling vs non-preemptive scheduling
- 2.6 Process scheduling (FCFS, SJF, PR, priority, real time scheduling)

3. Memory management

[8 Hrs]

- 3.1 Memory management without swapping
- 3.2 Swapping
- 3.3 Virtual memory
- 3.4 Paging, page replacement algorithms (FIFO, optimal, LRU, LFU, NRU, random, clock, second-chance)
- 3.5 Predicting page faults
- 3.6 Segmentation with paging

4. File system

[6 Hrs]

- 4.1 Files
- 4.2 Directories
- 4.3 File system implementation
- 4.4 Protection mechanism and operating system securities

5. **Input/ output** [7 Hrs]
- 5.1 Principles of input output hardware
 - 5.2 Principles of input output software
 - 5.3 Disks and disk scheduling algorithms (FSFS, SSTF, LOOK, SEEK, SCAN, C-SCAN, C-LOOK, N-SCAN)
 - 5.4 Clocks
 - 5.5 Terminals
6. **Deadlocks** [7 Hrs]
- 6.1 Introduction
 - 6.2 Conditions of deadlock
 - 6.3 Resources and deadlock modeling using resources
 - 6.4 Deadlock detection and recovery
 - 6.5 Deadlock avoidance & prevention
 - 6.6 Banker's algorithm (single and multiple resources)
7. **Real time system** [2 Hrs]
- 7.1 Introduction
 - 7.2 Types of RTS (soft real time, hard real time, firm real time)
8. **Distributed system** [3 Hrs]
- 8.1 Introduction and characteristics
 - 8.2 Processes and processors in distribution system
 - 8.3 RPC in distributed system

Case study: UNIX/LINUX/Windows/Android / iOS / Cloud OS. (No classes are allotted to the case study; the students themselves referring various books should study this unit)

Laboratory: There shall be lab exercises covering various features of different operating systems.

1. General commands and programming in LINUX
2. Process scheduling
3. Page replacement algorithms
4. Deadlock modeling
5. Memory fitting algorithms

References:

- Andrew S. Tanenbaum, *"Modern Operating System"*, PHI
- Silberschatz and Galvin, *"Operating System Concepts"*, Addison Wesley
- Andrew S. Tanenbaum, *"Operating System, Design & Implementation"*, PHI

Project – V
BIT378CO

Year III

Semester: V

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
-	-	3	-	60	-	40	100

Course Objective

After finishing this project, students will be able to develop web-based application using server-side scripting.

Course contents

A total of 45 lab hours covering all the features of server-side scripting will be assigned to every student. Every group of students (up to 3) will be assigned a project work. Students must develop the assigned application, submit written report and give oral presentation.

Project evaluation criteria

The practical marks allocated for the project should be evaluated based on the following criteria:

- Title presentation – 10 marks
- Mid-term presentation – 15 marks
- Pre-final submission and presentation – 35 marks