BACHELOR OF BUSINESS INFORMATION MANAGEMENT (BIM)
Curriculum

Effective from the Academic Batch 2021 AD

Office of the Dean
Faculty of Management
Tribhuvan University
Kathamandu

TRIBHUVAN UNIVERSITY
Faculty of Management

INTRODUCTION TO FACULTY OF MANAGEMENT

The Faculty of Management (FOM), Tribhuvan University has its ultimate objective of educating students for professional pursuits in business, industry and government. It is further dedicated to contributing to an increase in the knowledge and understanding of business and public administration. FOM aims at developing a networking with management institutes in the country and abroad to exchange new knowledge, technology, and methods of achieving higher level efficiency in management of business and public entities. It also attempts to continuously innovate and promote cost-effective, socially relevant, modern technology based educational programs in Nepal.

The FOM offers instructions leading to Bachelor of Business Studies (BBS), Bachelor of Travel and Tourism Management (BTTM), Bachelor of Hotel Management (BHM), Bachelor of Information Management (BIM), Bachelor of Business Administration (BBA), Bachelor of Public Administration (BPA), Bachelor of Mountaineering Studies (BMS), Bachelor of Business Administration - Finance (BBA-F), Post Graduate Diploma in Police Sciences (PGDPS), Master of Business Management (MBM), Master of Business Studies (MBS), Master of Public Administration (MPA), Master of Travel and Tourism Management (MTTM), Master of Hospitality Management (MHM), Master of Finance and Control (MFC), Master of Business Administration (MBA) and Master of Business Administration in Global Leadership and Management (MBA in GLM), Master of Business Administration in Information Technology (MBA IT), Master of Business Administration - Finance (MBA-F), Master of Business Administration in Corporate Leadership (MBA-CL), Master of Business Administration in Marketing (MBA - M), Master of Adventure Tourism Studies (MATS), The FOM also offers Master of Philosophy (M. Phil.) in Management, Master of Philosophy (M. Phil.) in Public Administration leading to a Degree of Doctor of Philosophy (Ph. D.).

FOM's GOALS

- Prepare professional managers capable of handling business in a dynamic global environment.

- Produce socially responsible and creative entrepreneurs capable of promoting business and industry for the socio-economic development of Nepal.

- Conduct research and management development programs for updating the knowledge and skills in academia and corporate world.

- Innovate and promote management programs catering to the needs of various social and economic sectors of Nepal.

- Establish linkages with leading universities and management institutes abroad and collaborate with them in development programs and their implementation in the work place.

BACHELOR OF INFORMATION MANAGEMENT (BIM) PROGRAM

The Bachelor of Information Management (BIM) is a four year eight semester program of the Faculty of Management, Tribhuvan University offering integrated Information Technology and Management courses. This course is envisioned to enable students to develop skills in information technology, and then apply the theories and concepts of a broad, integrated curriculum covering computing, informatics, business fundamentals, and critical and analytical decision-making.

MISSION

The mission of FOM's Bachelor of Information Management (BIM) program is to develop socially responsive, creative, and result oriented information technology (IT) professionals. The BIM program is designed to equip graduates with the skills and attributes required to be effective and efficient information technology professionals.

OBJECTIVES OF THE PROGRAM

Prepare IT professionals proficient in the use of computers and computational techniques in order to develop effective information systems to solve real life problems in the organizational milieu.
Develop students' skill in object-oriented software design methods and data management systems.
Provide professional training to students by combining information technology with managerial skills.
Prepare students to proceed on to postgraduate level study in information management within and outside the country.

ELIGIBILITY CONDITION FOR ADMISSION

Students applying for admission to the BIM program must have

- Successfully completed twelve-year schooling or its equivalent from any university, board or institution recognized by Tribhuvan University.

- Minimum D+ grade in each subject of grade 11 and 12 with CGPA 1.80 or more / Secured at least second division in the 10+2, PCL or equivalent program; and

- Complied with all the application procedure.

ADMISSION CRITERIA

Written Test:
Eligible applicants are required to appear in the entrance test commonly known as Central Management Admission Test (CMAT) conducted by the Faculty of Management. The test will follow the international testing pattern and standards. It includes the areas like:
Verbal ability
Quantitative ability
Logical reasoning
General awareness

There shall be altogether one hundred (100) objective questions in the CMAT containing twenty (25) questions in each section with a total weight of 100 marks. Student must secure a minimum of 40% in the CMAT in order to qualify for the interview.

Interview
Applicants securing above cut off point marks in the CMAT will be short-listed. Only short listed candidates will be interviewed and selected for admission.

Teaching Pedagogy

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, role play, research work, project work (individual and group), assignments (theoretical and practical), and term papers. The teaching faculty will determine the choice of teaching pedagogy as per the need of the course.

The concerned faculty shall develop a detailed course outline and work plan at the beginning of each semester and also recommends the basic text and other reference materials for effective teaching-learning of the course modules.

Internship

In the final semester, students shall be attached to organizations where they have to work for a period of eight weeks. Each student shall prepare an individual project report in the prescribed format based on his / her work in the respective organization assigned to him / her. Evaluation of the internship shall be based on the confidential report by the organization, project report and presentation of the report. The report must be submitted by the end of the eighth semester. Students must secure a minimum grade of "C" in the internship. The internship carries a weight equivalent to 3 credit hours.

Examination, Evaluation and Grading System

The BIM program will be executed through the semester system. The regular program shall be completed in eight semesters. The internal (ongoing) evaluation and the external (end of semester) examination shall carry 40 percent and 60 percent weightage respectively. The semester examinations shall be conducted by FOM. The final grade of the student shall be determined on the overall performance in the internal and external examinations.

Passing Grade and Grading System

The final evaluation of students is done through the examination conducted by Tribhuvan University. Students must secure a minimum of grade 'B' or Grade Point Average (GPA) of 3.0 in the internal evaluation in order to qualify to appear in the semester examination. In order to pass the semester examination the student must secure a minimum of grade 'B' or the Cumulative Grade Point Average (CGPA) of 3.00. The grading system shall be as follows:

Letter Grade	Cumulative Grade Point Average (CGPA)	Marks Obtained in Percent	Divisions / Remarks
A	4.00	90 - 100	Distinction
A-	3.70 - 3.99	80 - 89.9	Very Good
B+	3.30 - 3.69	70 - 79.9	First Division
B	3.00 - 3.29	60 - 69.9	Second Division
B-	2.70 - 2.99	50 - 59.9	Pass in Individual Subject
F	Below 2.70	Below 50	Fail

Make up/Retake Exam
Make up/Retake examination shall be conducted as per the semester guidelines.

ATTENDANCE
Students are required to attend regularly all theory and practical classes, assignments, study tour, field trip, seminars and presentations as required by the course. A student is required to attend at least 80 percent of such activities in order to qualify for the semester examination.

CREDIT TRANSFERS AND WITHDRAWL
The program allows students to transfer the credits earned by them in similar program of other universities recognized by Tribhuvan University. A student who has partially completed the BIM program and would like to discontinue his / her studies shall also be allowed to withdraw from the program. In such cases, a certificate specifying the credit earned by the student in the program shall be provided.

GRADUATION REQUIREMENTS

The BIM program extends over eight semesters (four academic years). The BIM degree is awarded upon its successful completion of all the following requirements specified by the curriculum.

The successful completion of 126 credit hours as prescribed with a minimum of passing grade in all courses with an aggregate CGPA of 3.00.
A minimum of grade 'B' obtained in the Industrial Attachment Project.
Completion of courses for the fulfillment of the requirements of the BIM program must occur within seven years from the time of registration.

CURRICULAR STRUCTURE

The BIM program requires the students to study a total of 126 credit hours. The curricular structure of the program comprises of the following four separate course components.

I.	Management Courses	30 Cr
II.	Analytical and Support Courses	21 Cr
III.	Information Technology and Computing Courses	63Cr
IV.	Elective Courses	06 Cr
V.	Project	03 Cr
VI.	Internship	03 Cr
	Total	126 Cr

Code	Subject	Credit Hrs
I. Management Courses		**30 Cr**
MGT 231	Foundation of Business Management	3 Cr
MGT 241	Organizational Behavior and Human Resource Management	3 Cr
ENG 203	Business Communication	3 Cr
Acc 201	Financial Accounting	3 Cr
ACC 202	Cost and Management Accounting	3 Cr
FIN 229	Fundamentals of Corporate Finance	3 Cr
MKT 201	Fundamentals of Marketing	3 Cr
MGT 240	Strategic Management	3 Cr
MGT 236	Business Environment	3 Cr
ECO 206	Microeconomics & Macroeconomics for Business	3 Cr
II. Analytical and Support Courses		**21 Cr**
ENG 206	English	3 Cr
MTH 204	Basic Mathematics	3 Cr
IT 235	Discrete Structure	3 Cr
STT 211	Business Statistics	3 Cr
SOC 203	Sociology for Business Management	3 Cr
MGT 205	Operations Management	3 Cr
RCH 201	Business Research Methods	3 Cr
III. Information Technology and Computing Courses		**63 Cr**
IT 231	Foundation of Information Technology	3 Cr
IT 233	Digital Logic	3 Cr
IT 232	C Programming	3 Cr
IT 240	Business Data Communication and Networking	3 Cr
IT 237	Web Technology I	3 Cr
IT 234	Object Oriented Programming with Java	3 Cr
IT 236	Microprocessor and Computer Architecture	3 Cr
IT 238	Data Structure and Algorithm	3 Cr
IT 239	Web Technology II	3 Cr
IT 220	Database Management System	3 Cr
IT 241	Operating System	3 Cr
IT 242	Software Design and Development	3 Cr
IT 243	Programming with Python	3 Cr
IT 244	Information Security	3 Cr
IT 228	Artificial Intelligence	3 Cr
IT 245	Business Information System	3 Cr
IT 246	It Ethics and Cybersecurity	3 Cr
IT 247	E-Commerce and Internet Marketing	3 Cr
IT 248	IT Entrepreneurship and Management	3 Cr
IT 249	Business Intelligence	3 Cr
IT 250	Digital Economy	3 Cr
IV. Elective Courses		**06 Cr**
IT 271	Networking and System Administration (7th)	3 Cr
IT 272	Mobile Application Development (7th)	3 Cr
IT 273	Multimedia System Application (7th)	3 Cr
IT 274	Data Warehousing and Data Mining (7th)	3 Cr
IT 275	.NET Programming (8th)	3 Cr
IT 276	Database Administration (8th)	3 Cr
IT 277	Cloud Computing (8th)	3 Cr
IT 278	Big Data and Analytics (8th)	3 Cr

	Project and Internship	**06 Cr**
IT 350	Internship	3 Cr
IT 352	Project	3 Cr

COURSE CYCLE

Code	**First Semester**	**15 Cr**
IT 231	Foundation of Information Technology	3 Cr
IT 232	C Programming	3 Cr
ENG 206	English I	3 Cr
MGT 231	Foundation of Business Management	3 Cr
MTH 204	Basic Mathematics	3 Cr
	Second Semester	**15 Cr**
IT 233	Digital Logic	3 Cr
IT 234	Object Oriented Programming with Java	3 Cr
IT 235	Discrete Structure	3 Cr
ENG 203	Business Communications	3 Cr
MGT 241	Organizational Behavior & Human Resource Management	3 Cr
	Third Semester	**15 Cr**
IT 236	Microprocessor and Computer Architecture	3 Cr
IT 237	Web Technology I	3 Cr
IT 238	Data Structure and Algorithms	3 Cr
ACC 201	Financial Accounting	3 Cr
STT 201	Business Statistics	3 Cr
	Fourth Semester	**18 Cr**
IT 239	Web Technology II	3 Cr
IT 220	Database Management System	3 Cr
IT 240	Business Data Communication and Networking	3 Cr
IT 241	Operating System	3 Cr
ECO 206	Economics for Business	3 Cr
ACC 202	Cost and Management Accounting	3 Cr
	Fifth Semester	**15 Cr**
IT 242	Software Design and Development	3 Cr
IT 243	Programming with Python	3 Cr
IT 244	Information Security	3 Cr
IT 228	Artificial Intelligence	3 Cr
MKT 201	Fundamentals of Marketing	3 Cr
	Sixth Semester	**18 Cr**
IT 245	Business Information Systems	3 Cr
IT 246	IT Ethics and Cybersecurity	3 Cr
IT 352	Project	3 Cr
FIN 229	Fundamentals of Corporate Finance	3 Cr
MGT 236	Business Environment	3 Cr
RCH 201	Business Research Methods	3 Cr
	Seventh Semester	**15 Cr**
IT 247	E-Commerce and Internet Marketing	3 Cr
	Elective I	3 Cr
SOC 203	Sociology for Business Management	3 Cr
MGT 205	Operations Management	3 Cr
MGT 240	Strategic Management	3 Cr

Eighth Semester		15 Cr
IT 248	IT Entrepreneurship and Management	3 Cr
IT 249	Business Intelligence	3 Cr
IT 250	Digital Economy	3 Cr
IT 350	Internship	3 Cr
	Elective II	3 Cr

Tribhuvan University
Faculty of Management
Office of the Dean

Course detail of
BIM (Bachelor of Information Management) 4th Semester

October 2023

ACC 202: Cost and Management Accounting
BIM 4th Semester

Credits: 3
Lecture Hours: 48

Course Objectives
The objectives of the course are to provide the students with in-depth knowledge of cost and management accounting in order to enable them to develop, arrange and classify cost information required for decision making for maximizing the profit. The course further aims at developing a sound base for higher study in accounting besides in practical knowledge required by the middle level managers to handle cost information independently.

Course Description
This course contains conceptual and theoretical foundation of cost and management accounting ; It also comprises classification and segregation of cost, accounting for material and labour, allocation, apportionment and absorption of overhead cost, costing in different situations such as service costing, income statement under variable and absorption costing techniques, standard costing system with material and labour cost variance, flexible budgeting under different levels of activities, overhead cost variance and functional budgeting.

Course Details
Unit 1: Conceptual Foundation   2 LHs
Cost accounting and management accounting; Meaning, objectives, advantages and limitations of cost and management accounting; Limitations of financial accounting; Similarities and dissimilarities in financial, cost and management accounting

Unit 2: Cost Concept and Cost Classification   4 LHs
Concept, importance and classification of cost: basic concept of cost and expense; cost classification: based on function, behavior, controllability, decision making, time of recording, planning and control, period and product cost;
Cost segregation and estimation: concept and methods of cost segregation: i) Two point method ii) Least square method and iii) Estimation of cost

Unit 3: Accounting for Materials   4 LHs
Materials/Inventory: Concept, reasons and objectives for holding material/inventory. Inventory control: Meaning, importance and techniques; Economic order quantity: concept, techniques, formula and trial & error approaches-considering discount under certainty condition; Re-order level, maximum stock level, minimum stock level, average stock level, danger level and safety stock; Concept and techniques of perpetual inventory system; Stock control through ABC analysis and just in time inventory: concept, advantages and limitations.

Unit 4: Accounting for Labour Cost   3 LHs

Labour Cost: Concept and need for control of labour cost; Remuneration without premium plan: Features of good remuneration system, time and piece wage system; Remuneration with premium Plan: Features of premium plan, premium bonus scheme- Halsey and Rowan Plan, Taylor's Differential Piece Rate, Gant's Task and Bonus Plan.

Unit 5: Accounting for Overhead Cost   5 LHs

Overhead Cost: Meaning, features, importance and classification; Apportionment and absorption of overhead: meaning and importance; apportionment and absorption of overhead cost based on volume, direct labour hours and direct machine hours.

Unit 6: Costing in Service Sectors   6 LHs

Service Costing: Concept, features and scope of service costing; Preparation of cost sheet for transport service for passenger, hospital, hotel and restaurant services, limitations of service costing.

Unit 7: Accounting for Profit Planning   8 LHs

Variable Costing and Absorption Costing: Concept, features, importance and preparation of income statement under variable costing and absorption costing; Over and under absorption of fixed manufacturing overhead and adjustment; Limitations of variable costing and absorption costing; Reconciliation of profit or loss between absorption and variable costing techniques showing the causes of differences.

Cost Volume Profit Analysis: Meaning, importance; assumptions and limitations of CVP analysis; Contribution margin or ratio, profit volume ratio; Break even analysis using contribution margin, algebraic approaches; Break-even-analysis: under various situations: changes on selling price, fixed cost, variable cost, multi-products situations, margin of safety and determination of selling price to realize desired profit ; Advantages and limitations of break even analysis.

Unit 8: Cost Accounting for Planning and Control   12 LHs

Standard Costing: Concept of standard cost and standard costing, features, application, advantages and limitations; Difference between standard and budget.

Variance Analysis; Material variances: Concept and calculation of cost, price, usage, mix and yield variances; Labour variances: Concept and calculation of cost, efficiency, rate, mix, idle time and yield variances.

Overhead Cost Variance: Concept and calculation of capacity, efficiency and spending variances.

Budget: concept, features and importance of budget; Types of budget: sales budget, production budget, material budget & merchandize purchase budget, labour budget, manufacturing overhead budget, cost of goods manufactured budget, selling/distribution & administrative expenses budget and cost of goods sold budget.

Fixed and Flexible Budgeting: Concept and importance of fixed and flexible budgets; Difference between fixed and flexible budgets; Flexible budgeting for overhead cost control on activity levels and budget allowance for actual level attained.

Unit 9: Short term Decision Making   **4 LHs**

Concept, need and objectives of short term decisions in business; Cost concept in decision making: Relevant and irrelevant costs, avoidable and unavoidable costs, opportunity cost; Types of decisions: Drop or Continue, Special Offer/Order and Make or Buy

Suggested Readings

Atkinson, A. A., Kaplan, R. S., Matsumura, E.M., Young, S.M & Kumar, G. A. (2012). *Management Accounting /6e*. New Delhi: Pearson Education Pvt. Ltd.

Garrison, R. H. & Noreen, E. W. (2017).*Managerial Accounting* McGraw-Hill Companies, Inc.

Lynch , R.M. & Williamson, R.W. *Accounting for Management Planning & Control,* Tata McGraw Hill Co.

Pillai, R.S.N. & Bagavathi (2017). *Cost Accounting* New Delhi: S. Chand and Company Ltd.

ECO 206: Economics for Business
BIM 4th Semester

<div align="right">

Credits: 3
Lecture Hours: 48

</div>

Course Objectives
This course aims to develop students' understanding of fundamentals of the microeconomics and macroeconomics in order to enhance their skill in analyzing business opportunities and markets for optimum use of resources in business practices blending with information technology.

Course Description
This course comprises the basic economic issues; concepts, scope, and business applications of micro and macroeconomics; analysis of demand, supply and market efficiency, production, cost, and profit analysis, market structures and pricing practices, and fundamentals of macroeconomics.

Course Learning Outcomes
By the completion of the course students will be able to:
- Describe the concept of scarcity, choice and alternatives, and nature of micro and macroeconomics, and also assess the inter-linkages between economics and business decisions.
- Explain the demand and supply model, and economic efficiency and also measure the elasticity of demand and supply and use of price elasticity of demand in business decision making.
- Explain the production functions and determine the optimal combination of inputs and also examine the behavior of short-run and long-run cost functions.
- Describe cost concepts, economies of scale, and business profit vs economic profit.
- Explain market structures and profit-maximizing goal of the firm and also explain the pricing of real practices.
- Know the determinants of wage differentials and interest rate differentials.
- Calculate the national income and describe the macroeconomic issues and policies

Course details:
Unit 1: Introduction   5 LHs
Basic economic issues: scarcity, choice, and alternatives; Microeconomics: concepts and scope, microeconomics and business operations; and Macroeconomics: concepts and scope, macroeconomics and business environment.

Unit 2: Analysis of Demand, Supply, and Market Efficiency   14 LHs
Demand function: concept and types; Movement along a demand curve and shifts in demand curve; Supply function: concept and types; Movement along a supply curve and shifts in supply curve; Market Equilibrium; Economic efficiency: concept and measurement; Price elasticity of demand: concept and calculation; Price elasticity of demand in demand curve; Concept of revenue and relationship between revenue and price elasticity of demand; Uses of price elasticity of demand in business decision making; Concept and calculation of income elasticity of demand, cross elasticity of demand and advertisement elasticity of demand; Price elasticity of supply: concept and calculation.

Unit 3: Production, Cost, and Profit analysis   **12 LHs**

Production function: concept and types; Factors of production; Law of variable proportions and optimal employment of one variable input; Isoquants: assumptions, properties and principle of marginal rate of technical substitution, Optimal employment of two variable inputs; and Laws of returns to scale; Cost function; Various concepts of costs: opportunity cost, explicit and implicit costs, accounting and economic costs; Short run costs: behavior of short-run total, average and marginal costs and cost curves; Derivation of LAC and LMC; Relation between AC and MC; Economies and diseconomies of scale; Business profit and economic profit.

Unit 4: Market Structure and Pricing Practices   **5 LHs**

Market structure: concepts and characteristics of perfect competition, monopoly, monopolistic competition and oligopoly market; Goal of the firm: profit maximization; Pricing practices: price discrimination, cost plus pricing, two-part tariffs, bundling; Concept of wage differentials and interest rate differentials.

Unit 5: Fundamentals of Macroeconomics   **12 LHs**

Concept and measurement of national accounts: GDP, GNP, NI, PDI, and per capita income; Nominal GDP, Real GDP, and GDP deflator; Consumption, saving, and investment functions; Inflation: concepts and measurement; Demand-pull and cost-push inflation; Concept of deflation; Business cycles: concept and phases; Balance of payments: concept and components; Exchange rate determination: concepts, fixed and flexible exchange rate; Monetary policy: concept, instruments and objectives; Fiscal policy: concept, instruments and objectives.

Suggested Readings

Browning and Browning. **Microeconomic Theory and Applications,** New Delhi, Kalyani Publishers Latest Edition

Case, K. E., and Fair, R.C. **Principles of Economics,** Singapore, Pearson Education. Latest Edition

Dwivedi, D.N. **Macroeconomics: Theory and Policy,** Delhi, Pearson Education Pvt. Ltd. Latest Edition

McConnell C.R. and Brue, S. **Economics: Principles, Problems, and Policies,** New York, McGraw Hill. Latest Edition

Shreshtha, R.G. and Adhikari, G.M. Economics for Business, Kathmandu, KEC Publications. Latest Edition

IT 239: Web Technology II
BIM 4ᵗʰ Semester

Credits:3
Lecture Hours: 48

Course Description:
This course covers different concepts of server-side Web development using PHP, MySQL, and server-side frameworks.

Course Objectives:
The main objective of this course is to provide students both theoretical and practical knowledge of different technologies that are used for server-side Web development.

Course Details

Unit 1: Introduction   **10 LHs**

> Server-side Scripting; Setting Up Development Server; PHP Basics: Introduction, Syntax, Comments, Output, Variables, Constants, Data Types, Operators; Control Statements (if, switch, for, for each, while, do-while, break, and continue); Functions (Defining Functions, Passing Arguments, Returning Value from Functions); Including and Requiring Files; PHP Super global.

Unit 2: Strings and Arrays   **6 LHs**

> String and String Functions; Array (Definition, Numerically Indexed Array, Associative Array, Multidimensional Array, Using for each loop, Multidimensional Arrays, Array Functions); Regular Expressions.

Unit 3: Object-Oriented Programming   **10 LHs**

> OOP Terminologies; Defining Classes; Creating Objects; Constructor and Destructor; Access Modifiers; Inheritance; Constants; Abstract Classes; Interfaces; Static Methods and Properties; Namespace; Exception Handling.

Unit 4: File and Form Handling   **5 LHs**

> Reading and Writing Files; Building forms; Retrieving and Processing Form Data.

Unit 5: Working with Database   **5 LHs**

> Using PHP to Create Connection with Databases, Querying Databases, CRUD Operations Using Forms.

Unit 6: Cookies, Sessions and Authentication   **4 LHs**

> Setting, Accessing, and Destroying Cookies; HTTP Authentication; Using Sessions (Starting, Ending, Setting a Timeout, and Session Security).

Unit 8: Server-Side Web Framework   **8 LHs**

> Basics of any one Server-Side Web Framework.

Laboratory Works:
The laboratory work includes creating dynamic web pages using PHP, MySQL, and server-side web frameworks.

Suggested Readings

*Learning PHP, MySQL **and JavaScript: A Step-by-Step Guide to Creating Dynamic Websites***, Robin Nixon, O'reilly.
*PHP & MYSQL: **Server-side Web Development***, Jon Duckett, John Wiley & Sons, Inc.
Murach's PHP and MySQL, Joel Murach and Ray Harris, Mike Murach and Associates, Inc.
Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe , Peter MacIntyre, O reilly.
www.w3schools.com

IT 240: Business Data Communication and Networking
BIM 4th Semester

Credits:3
Lecture Hours: 48

Course Objectives
The main objective of this course is to introduce different concepts of business data communication and computer networking. Special focus will be given to layers of networking model, wired and wireless LAN, WAN, backbone network, Internet and network design and management.

Course Description
This course is designed to provide students with a comprehensive understanding of business data communication and networking concepts. The course covers different aspects of data communications and computer networking, including fundamental concepts, different layers of networking model, LAN, WAN, backbone network, Internet, and network design and management.

Course Details
Unit 1: Introduction to Data Communications   3 LHs
Introduction; Data Communications Networks (Components of a Network, Types of Networks); Network Models (Open Systems Interconnection Reference Model, Internet Model, Message Transmission Using Layers); Network Standards (The Importance of Standards, The Standards-Making Process, Common Standards); Future Trends (Wireless LAN and BYOD, The Internet of Things, Massively Online).

Unit 2: Application Layer   4 LHs
Introduction; Application Architectures (Host-Based Architectures, Client-Based Architectures, Client-Server Architectures, Cloud Computing Architectures, Peer-to-Peer Architectures, Choosing Architectures); World Wide Web (Working of WWW, HTTP Request and Response); Electronic Mail (Working of Email, SMTP Packet, Multipurpose Internet Mail Extension); Other Applications (Telnet, Instant Messaging, Videoconferencing).

Unit 3: Physical Layer   7 LHs
Introduction; Circuits (Circuit Configuration, Data Flow, Multiplexing); Communication Media (Twisted Pair Cable, Coaxial Cable, Fiber-Optic Cable, Radio, Microwave, Satellite, Media Selection); Digital Transmission of Digital Data (Coding, Transmission Modes, Digital Transmission, How Ethernet Transmits Data); Analog Transmission of Digital Data (Modulation, Capacity of a Circuit, How Modems Transmit Data); Digital Transmission of Analog Data (Translating from Analog to Digital, How Telephones Transmit Voice Data, How Instant Messenger Transmits Voice Data, Voice over Internet Protocol).

Unit 4: Data Link Layer   5 LHs

Introduction; Media Access Control (Contention, Controlled Access, Relative Performance); Error Control (Sources of Errors, Error Prevention, Error Detection, Error Correction via Retransmission, Forward Error Correction, Error Control in Practice); Data Link Protocols (Asynchronous Transmission, Synchronous Transmission); Transmission Efficiency.

Unit 5: Network and Transport Layers   7 LHs

Introduction; Transport and Network Layer Protocols (Transmission Control Protocol, Internet Protocol); Transport Layer Functions (Linking to the Application Layer, Segmenting, Session Management); Addressing (Assigning Addresses, Address Resolution); Routing (Types of Routing, Routing Protocols, Multicasting, The Anatomy of a Router); TCP/IP Example (Known Addresses, Unknown Addresses, TCP Connections, TCP/IP and Network Layers).

Unit 6: Wired and Wireless Local Area Networks   6 LHs

Introduction; LAN Components (Network Interface Cards, Network Circuits, Network Hubs, Switches, and Access Points, Network Operating Systems); Wired Ethernet (Topology, Media Access Control, Types of Ethernet); Wireless Ethernet (Topology, Media Access Control, Wireless Ethernet Frame Layout, Types of Wireless Ethernet, Security); The Best Practice LAN Design (Designing User Access with Wired Ethernet, Designing User Access with Wireless Ethernet, Designing the Data Center, Designing the e-Commerce Edge, Designing the SOHO Environment); Improving LAN Performance (Improving Server Performance, Improving Circuit Capacity, Reducing Network Demand).

Unit 7: Backbone Networks   4 LHs

Introduction; Switched Backbones; Routed Backbones; Virtual LANs (Benefits of VLANs, How VLANs Work); The Best Practice Backbone Design; Improving Backbone Performance (Improving Device Performance, Improving Circuit Capacity, Reducing Network Demand).

Unit 8: Wide Area Networks   4 LHs

Introduction; Dedicated-Circuit Networks (Basic Architecture, T-Carrier Services, SONET Services); Packet-Switched Networks (Basic Architecture, Frame Relay Services, IP Services, Ethernet Services); Virtual Private Networks (Basic Architecture, VPN Types, How VPNs Work); The Best Practice WAN Design; Improving WAN Performance (Improving Device Performance, Improving Circuit Capacity, Reducing Network Demand).

Unit 9: The Internet   2 LHs

Introduction; How the Internet Works (Basic Architecture, Connecting to an ISP, The Internet Today); Internet Access Technologies (Digital Subscriber Line, Cable Modem, Fiber to the Home, WiMax); The Future of the Internet (Internet Governance, Building the Future).

Unit 10: Network Design and Management   **6 LHs**

Introduction to Network Design (Network Architecture Components, The Traditional Network Design Process, The Building-Block Network Design Process); Needs Analysis (Network Architecture Component, Application Systems, Network Users, Categorizing Network Needs, Deliverables); Technology Design (Designing Clients and Servers, Designing Circuits, Network Design Tools, Deliverables); Cost Assessment (Request for Proposal, Selling the Proposal to Management, Deliverables). Introduction to Network Management; Designing for Network Performance (Managed Networks, Managing Network Traffic, Reducing Network Traffic); Configuration Management (Configuring the Network and Client Computers, Documenting the Configuration); Performance and Fault Management (Network Monitoring, Failure Control Function, Performance and Failure Statistics, Improving Performance); End User Support (Resolving Problems, Providing End User Training); Cost Management (Sources of Costs, Reducing Costs).

Laboratory Works:

The laboratory work consists of:

- Understanding of Network equipment and wiring
- Using basic Networking commands
- Working with IP addressing and subnetting Linux/windows machine
- Learning to use Packet Tracer, creating and testing LAN, working with VLANs
- Learning basic Router Configuration and routing
- Implementing firewall, router access control list
- Learning packet capture and header analysis of TCP, UDP, and IP
- Configuring DNS, Web, and FTP server

Suggested Readings:

Jerry FitzGerald, Alan Dennis, and Alexandra Durcikova, "Business Data Communications and Networking", 13th Edition, Wiley, 2017

Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw-Hill, 2013

Andrew S. Tanenbaum, Nick Feamster, and David Wetherall, "Computer Networks", 6th Edition, Pearson, 2021

William Stallings and Thomas Case, "Business Data Communications: Infrastructure, Networking and Security", 7th Edition, Pearson, 2013

IT 241: Operating System
BIM 4th Semester

Course Objectives
This course aims to provide the students both theoretical and practical knowledge of operating system components such a scheduler, memory manager, file system handlers and I/O device managers, operating system security.

Course Description
This course includes the basic concepts of operating system. It consists of process management, deadlocks and process synchronization, memory management techniques, File system implementation, I/O device management principles, Operating system security, Distributed operating system. It also includes case study on Linux, Windows and Mobile operating system.

Course Details
Unit 1: Operating System Overview   4 LHs
Introduction of Operating System, Evolution of Operating System, Types of OS, Function of Operating System, System Call, Handling System Calls, Operating System Structures, Kernel and its types, Shell, Open-Source Operating Systems.

Unit 2: Processes and Threads   11 LHs
Process vs Program, Multiprogramming, Process Model, Process Creation, Process States, Process Control Block, Threads, Thread vs Process, User and Kernel Space Threads, Inter Process Communication: Race Condition, Critical Regions, Implementing Mutual Exclusion: Mutual Exclusion with Busy Waiting (Disabling Interrupts, Lock Variables, Strict Alteration, Peterson's Solution, Test and Set Lock), Sleep and Wakeup, Semaphore, Monitors, Message Passing,

Process Scheduling: Introduction and aim, Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling, Multiple Queues).

Classical IPC problems: Producer Consumer, Sleeping Barber, Dining Philosopher Problem,

Unit 3: Deadlocks   5 LHs
Introduction, Deadlock Characterization, Preemptable and Non-preemptable Resources, Resource Allocation Graph, Conditions for Resource Deadlock, Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance: Banker' Algorithm, Deadlock Detection (For Single and Multiple Resource Instances), Recovery from Deadlock (Through Preemption and Rollback)

Unit 4: Memory Management   **8 LHs**

    Introduction, Logical vs. Physical Address Spaces, Monoprogramming vs. Multi-programming, Modelling Multiprogramming, Relocation and Protection, Memory Management with Swapping: Bitmaps and Linked-list), Memory Allocation Strategies: Fixed-partition and Variable-partition strategies.

    Virtual memory: Paging, Page Table, Structure of Page Table, Handling Page Faults, TLB's, Page Replacement Algorithms: FIFO, Second Chance, LRU, Optimal, LFU, Clock, WS-Clock, Concept of Locality of Reference, Segmentation: Need of Segmentation, its drawbacks, Segmentation with Paging.

Unit 5: File Management   **6 LHs**

    File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout, Implementing Files: Contiguous allocation, Linked List Allocation, Linked List Allocation using Table in Memory, Inodes, Directory Operations, Path Names, Directory Implementation, Shared Files, Free Space Management: Bitmaps, Linked List

Unit 6: Device Management   **6 LHs**

    Classification of I/O devices, Controllers, Memory Mapped I/O, DMA Operation, Interrupts, Goals of I/O Software, Handling I/O (Programmed I/O, Interrupt Driven I/O, I/O using DMA), I/O Software Layers (Interrupt Handlers, Device Drivers), Disk Structure, Disk Scheduling (FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK), Disk Formatting (Cylinder Skew, Interleaving, Error handling), RAID

Unit 7: Operating System Security   **2 LHs**

    Basic Concepts of Operating System Security, Security Problems, Authentication and Authorization Mechanisms, Controlling access to resources, model of secure system.

Unit 8: Distributed Operating System   **2 LHs**

    Introduction, Advantages of Distributed operating system over centralized operating System, Communication Structure in Distributed system, message passing in Distributed System, Remote file Access,

Unit 9: Case Study   **4 LHs**

    Windows Operating System, Linux Operating System, Mobile Operating System.

Laboratory Works:

The laboratory work includes solving problems in operating system covering all the listed topic above.

Suggested Readings:

A. S. Tanenbaum, H. Bos "Modern Operating Systems", Pearson Education, Inc., Fourth edition, 2016.
A. Silberschatz, P. B. Galvin and G. Gagne, "Operating System Concepts", John Wiley & Sons (ASIA) Pvt. Ltd, Tenth Edition, 2018.

H. M. Deitel, P. J. Deitel, and D. R. Choffnes, "Operating Systems, Pearson Education, Inc., Third Edition, 2003.

W. Stallings, "Operating Systems: Internals and Design Principles", Pearson Education, Inc., 2018 Ninth Edition

IT 220: Database Management System
BIM 4th Semester

Course Objective
The main objective of this course is to introduce different concepts of database management system from theoretical and practical aspects.

Course Description
The course covers different concepts of database management systems including database system concepts and architecture, ER diagram, relational model, relational Calculus, SQL, normalization, transaction processing, concurrency control, and database recovery. This course also covers some advanced concepts of databases such as performance tuning, security, parallel and distributed database, data warehousing, data mining and bigdata.

Course Details
Unit 1: Database Concepts and Architecture   4 LHs
Database, Database Management System, Database Users, Database Administrator, advantages of Databases; Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; the Database System Environment; Centralized and Client/Server Architectures for DBMSs; Classification of Database Management Systems.

Unit 2: Data Modelling Using Entity-Relational Model and Relational Model   8 LHs
Using High-Level Conceptual Data Models for Database Design; Entity Types, Entity Sets, Attributes, and Keys; Relationship Types, Relationship Sets, Roles, and Structural Constraints; Weak Entity Types; ER Diagrams, Naming Conventions, and Design Issues; Relationship Types of Degree Higher Than Two; Concepts of Specialization and Generalization; Constraints and Characteristics of Specialization and Generalization; Converting ER Diagrams to Tables.

Unit 3: The Relational Algebra and Relational Calculus   5 LHs
Introduction of Relational Algebra, Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; the Tuple Relational Calculus; the Domain Relational Calculus.

Unit 4: Database Normalization   4 LHs
Informal Design Guidelines for Relational Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; First, Second and Third Normal Forms; Boyce-Codd Normal Form; Multivalued Dependency and Fourth Normal Form; Properties of Relational Decomposition.

Unit 5: SQL   15 LHs

Data Definition Language and Data Types, Specifying Constraints, Domain Types in SQL, Schema Definition in SQL. Data Manipulation Language: The select Clause, The where Clause, The from Clause, The Rename Operation, Tuple Variables, String Operations, Ordering the Display of Tuples, Duplicate Tuples. Set Operations. Aggregate Functions. Null Values. Nested Subqueries: Set Membership, Set Comparison, Test for Empty Relations, Test for the Absence of Duplicate Tuples. Derived Relations: Views. Modification of the Database: Deletion, Insertion, Updates, Updates, Update of a view. Joined Relations: Join types and Conditions, Basic concepts of Stored Procedure, DML Triggers, and Indexing.

Unit 6: Transaction Processing, Concurrency Control and Recovery Techniques   8 LHs

Introduction to Transaction Processing; Transaction and System Concepts; Desirable Properties of Transactions; Serializable Schedule; Two-Phase Locking and Timestamp Ordering Concurrency Control Techniques. Recovery Concepts; NO-UNDO/REDO Recovery Based on Deferred Update; Recovery Technique Based on Immediate Update; Shadow Paging; Database Backup and Recovery from Catastrophic Failures.

Unit 7: Advanced Topics   4 LHs

Database Performance Tuning; Database Security; Concept of Parallel and Distributed Databases; Concept of Data Warehousing and Data Mining, BigData, and NoSQL databases.

Laboratory Works:

The laboratory work includes writing SQL statements to create databases and tables, inserting and deleting data, updating data, and writing select queries. The students are required to undertake a project work. The project work can be done individually or in group (at most 4 students).

Suggested Reading

Fundamentals of Database Systems; Seventh Edition; Ramez Elmasri, Shamkant B. Navathe; Pearson Education

Database System Concepts; Sixth Edition; Avi Silberschatz, Henry F Korth, S Sudarshan; McGraw-Hill

NoSQL for Dummies; Adam Fowler; John Wiley & Sons, Inc.

Principles of Distributed Database Systems; M. Tamer Ozsu and Patrick Valduriez; Fourth Edition; Springer 2020

Database Management Systems; Third Edition; Raghu Ramakrishnan, Johannes Gehrke; McGraw-Hill

4. A First Course in Database Systems; Jaffrey D. Ullman, Jennifer Widom; Third Edition; Pearson Education Limited.