Engineering Economics

BEG395MS

Year III

Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
			Internal		Final		Total
Theory	Tutorial	Practical	Theory	Practical	Theory	Practical	
3	1	0	20	-----	80	-	100

Course Objectives

To provide the students a knowledge of the basic tools and methodology of economic studies f evaluation engineering project in private industry, in the public sector and in the utilities area.

1. **Introduction** (2 hrs)
   - 1.1 Definition and importance of engineering economics
   - 1.2 Business and accounting terminology
   - 1.3 Cash flow concept and representation
   - 1.4 Economic systems

2. **Cost Classification and Analysis** (4 hrs)
   - 2.1 The elements of cost
   - 2.2 Classification of cost: overhead cost, prime cost
   - 2.3 Cost variance analysis
   - 2.4 Job and process costing

3. **Interest and the Time Value of Money** (6 hrs)
   - 3.1 Simple interest, compound interest, interest tables, interest charts
   - 3.2 Present worth, Future worth and Annual worth
   - 3.3 Nominal and effective interest rates
   - 3.4 Continuous compounding and continuous compounding formula
   - 3.5 Interest calculations for uniform gradient

4. **Basic Methodology of Engineering Economic Studies** (8 hrs)
   - 4.1 Present worth, annual worth methods and future worth methods
   - 4.2 Internal rate of return method
   - 4.3 Drawbacks of the internal method
   - 4.4 External rate of return method
   - 4.5 Minimum attractive rate of return method
   - 4.6 The playback (pay-out) period method

5. **Cost/Benefit Analysis** (4 hrs)
   - 5.1 Conventional cost/benefit ratio
   - 5.2 Modified cost/benefit ratio
   - 5.3 Break-even analysis

6. **Investment Decisions** (8 hrs)
   - 6.1 Comparison of alternatives having some useful life
   - 6.2 Comparison of alternatives having different useful life
   - 6.3 Comparison of alternatives including of excluding the time value of money
   - 6.4 Comparison of alternatives using the capitalized worth method
   - 6.5 Definition of mutually exclusive investment alternatives in terms of combination of projects
   - 6.6 Comparison of mutually exclusive alternative

7. **Risk Analysis** (4 hrs)
   - 7.1 Projects operating under conditions of certainty
   - 7.2 Projects operating under conditions of [illegible]

7.3 Decision tree
7.4 Sensitivity analysis

(4 hrs)

8. **Depreciation and Taxation System in Nepal**
   8.1 Depreciation concept and terminology
   8.2 Depreciation methods (St. line method, Declining B. method, sinking fund method, SOYD method, MACRS method)
   8.3 Taxes on normal gains
   8.4 Taxes on capital gains
   8.5 After tax cash flow analysis and estimate
   8.6 Taxation law in Nepal
   8.7 VAT

(5 hrs)

9. **Demand Analysis and Sales Forecasting**
   9.1 Demand analysis
   9.2 Correlation of price and consumption rate
   9.3 Multiple correlation of price and consumption rate
   9.4 Market research techniques
   9.5 Sales forecasting

Tutorials:

- 3 Assignments, 2 Quizzes, 3 Case Studies

Note:

The case studies will concentrate on economic analysis and selection of public projects, analysis and selection of private projects, risk analysis and demand analysis.

References

- E.P. DeGramo, W.G. Sullivan and J.A. Bontadelli, 8th Edition, Macmillan Publishing, 1988
- N.N. Borish and S.Kaplan, "Economic Analysis: For Engineering and Managerial Making", McGraw-Hill

Marks Distribution:

Chapter	Marks
1 &2	12
3 & 4	28
5	8
6	16
7	8
8 & 9	8

Multimedia Computing and Technology

BEG376CO

Year: III

Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal		Final		Total
			Theory	Practical	Theory	Practical	
3	1	3/2	20	25	80		125

Course Objective/s:

To introduce the technologies, concept and techniques associated with the development of multimedia system.

DBMS 3+3+3 ch ch ch

1. **Multimedia System** (4 hrs)
   - 1.1 Introduction concept and structure
   - 1.2 media aspect properties
   - 1.3 Definition of multimedia system.
   - 1.4 Media combination and independence
   - 1.5 Traditional data stream characteristics introduction units.
2. **Sound and Audio** (4 hrs)
   - 2.1 Basic sound concept representation and formats, basic music (MIDI) concepts devices
   - 2.2 Message
   - 2.3 Standards and software speech: generation analysis and transformation
3. **Image and Graphics** (4 hrs)
   - 3.1 Basic image graphics representation and formats
   - 3.2 Image processing fundamentals Synthesis analysis and transformation.
4. **Video and Animation** (2 hrs)
   - 4.1 Basic Video concepts representation and format
   - 4.2 Basic concept of animation,
   - 4.3 Animation Language, Control and transformation.
5. **Data compression** (6 hrs)
   - 5.1 Data compression and coding fundamentals
   - 5.2 Basic data compression, techniques, data compression
   - 5.3 Coding standard JPEG MPEG and DVI
6. **Optical Storage Media** (3 hrs)
   - 6.1 Basic technology
   - 6.2 Video disk fundamentals
   - 6.3 CD audio, CD ROM and extended Architecture
   - 6.4 Principles of CD Write-Once and CD Magneto Capital.
7. **Documentation Hypertext and MHEG** (4 hrs)
   - 7.1 Document architecture and multimedia integration
   - 7.2 Hypertext, hypermedia and multimedia
   - 7.3 Hypermedia System: Architecture, nodes and pointers document

7.4 Architecture: SGML and ODA MEG

8. **Advanced Technologies in Multimedia**

8.1 Multimedia Operation System

8.1.1 Introduction
8.1.2 Resource management
8.1.3 Resource requirement allocation scheme
8.1.4 Continuous media resource model
8.1.5 Process management
8.1.6 Real-time processing requirement
8.1.7 Real-time scheduling
8.1.8 Earliest deadline first algorithm
8.1.9 Rate monotonic algorithm
8.1.10 System Architecture

8.2 Multimedia communication system

8.2.1 Multimedia communication architecture
8.2.2 Application subsystem
8.2.3 Transport subsystem
8.2.4 Quality of service and resource management

8.3 Abstraction of programming

8.3.1 Abstraction levels
8.3.2 Libraries system software
8.3.3 Toolkits Higher programming language
8.3.4 Object-oriented approaches

8.4 Abstraction of programming Synchronization

8.4.1 Introduction
8.4.2 Notion of synchronization
8.4.3 Presentation requirements
8.4.4 Reference model for multimedia synchronization
8.4.5 Synchronization specification

9. **Multimedia Application**

9.1 Video-On demand
9.2 Video Conferencing
9.3 Educational Application, Industrial Application
9.4 Information System, Multimedia archives & digital libraries, Media editors

Laboratory Exercises

1. Integration of multimedia (Audio, Speech, and Music Video, Static and, Movie, Animat
Programming etc.)
2. Image Enhancement in Photoshop
3. 2D & 3D animation in OpenGL Maya Flash C++
4. Image Compression Algorithm JPEG
5. Real Time Scheduling Algorithm

References

1. Steinmet, R. Nahrstedt K. Multimedia Computing Communications and applications Pearson Education asia 2001. ISBN 81-7808-319-1
2. Andleigh P. Thakrar, Multimedia System Design Prentice Hall, NJ 1996
3. Gibbs S.J. Tsichritzis, D.C. Multimedia Programming objects, Environment and frameworks Addsion-wesley-1995
4. Koegel-Buford J.F. Multimedia System Addsion-Wesley. 1994
5. J.Jeffcoate, Multimedia in Practise Technology &Application, PHI

Marks Distribution:

Chapter	Marks
1	8
2	8
3	8
4	4
5	12
6	4
7	4
8	28
9	4
Total	80

Project and Organization Management

BEG391MS

Year: III

Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal		Final		Total
			Theory	Practical	Theory	Practical	
2	1	0	10	0	40	-	50

Course Objectives

To gain the knowledge in project management as well as some concept of organization behavior

1. **Introduction** (6 hrs)
   - 1.1 Concept of project management
   - 1.2 Project life cycle
   - 1.3 Project environment
   - 1.4 Project impacts: social, economical and environmental

2. **Project planning and control** (10 hrs)
   - 2.1 Work breakdown structure
   - 2.2 Project network construction
   - 2.3 Network analysis by CPM & PERT
   - 2.4 Gantt Chart
   - 2.5 Project control cycle
   - 2.6 Project information and management

3. **Organization** (2 hrs)
   - 3.1 Organization and its characteristics
   - 3.2 Organization chart and types of organization

4. **Management** (6 hrs)
   - 4.1 Functions and Roles of management
   - 4.2 Management by objectives
   - 4.3 Functions of personnel management
   - 4.4 Cost management, Role management, Time management, HR management
   - 4.5 Job analysis and description

5. **Leadership and Industrial relations** (6 hrs)
   - 5.1 Leadership styles and theories of motivation
   - 5.2 Necessity of industrial relationship
   - 5.3 Trade union and Trade union movement in Nepal
   - 5.4 Health, safety and compensation

Probability and Statistics

Year: III

BEG203SH

Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
			Internal		Final		Total
Theory	Tutorial	Practical	Theory	Practical	Theory	Practical	
3	2	0	20	0	80	0	100

Course Objective/s:

To be able to use statistical tools needed to make evaluations of experimental data, apply elementary rules of probability in handling probability distributions and sampling distributions, obtain point and interval estimates for means and proportions, test hypotheses involving means and proportions and draw conclusions based on the results of statistical tests.

1. **Introduction and Descriptive Statistics** (5 hrs)
   - 1.1 An overview of Statistics :Application of Statistics in Engineering
   - 1.2 Pictorial Representation of Data (Pie-Chart, Histogram and Ogive Curves)
   - 1.3 Measures of location: Mean, Median, Mode and Partition Values.
   - 1.4 Measures of variability

2. **Correlation and Regression** (4 hrs)
   - 2.1 Correlation
   - 2.2 Coefficient of Correlation (Karl Pearsons only) and the coefficient of determination
   - 2.3 Regression
   - 2.4 Simple Regression Lines
   - 2.5 Properties

3. **Probability** (4 hrs)
   - 3.1 Sample spaces and events
   - 3.2 Axioms, interpretations and properties of probability
   - 3.3 Counting techniques
   - 3.4 Conditional probability
   - 3.5 Theorems on probability(Addition, Multiplication and Bayes)

4. **Discrete Random Variables and Probability Distributions** (7 hrs)
   - 4.1 Random variables
   - 4.2 Probability distributions for random variables
   - 4.3 Probability mass function and cumulative distribution function
   - 4.4 Expected values of discrete random variables
   - 4.5 The binomial probability distribution
   - 4.6 The hyper-geometric and negative binomial distributions (introduction only)
   - 4.7 The Poisson probability distributions

5. **Continuous Random Variables and Probability Distributions** (6 hrs)
   - 5.1 Continuous random variables and probability density functions
   - 5.2 Cumulative distribution functions and expected values for continuous random variables
   - 5.3 The normal distribution
   - 5.4 The Gamma Distribution(Introduction)
   - 5.5 Chi-Square Distribution (Introduction)

5.5 Chi-Square Distribution (Introduction) (5 hrs)

6.0 Estimation

6.1 Parameters and statistics

6.2 Standard error and sampling distribution

6.3 Point estimation and its properties

6.4 Interval Estimation(single of proportion & mean, difference of proportion & mean) (6 hrs)

7.0 Statistical Inference

7.1 Error in sampling (type I and II errors), level of significance , degree of freedom, one tailed and two tailed , some comments on selecting a test procedure

7.2 Large-sample tests (z-test)

7.3 Test for mean of normal population

7.4 Test for population mean, population proportion, difference between two population means and proportions (4 hrs)

8.0 Exact sampling distribution

8.1 Small sampling distribution (t-test)

8.2 t-test for single mean , two-samples t – test , analysis of paired data (4 hrs)

9.0 The analysis of categorical data

9.1 Chi-square test

9.2 Test procedures for a population variance

9.3 Test for goodness of fit

9.4 Two way contingency table and test of independence of attributes.

References

1 Jay L. Devore, "Probability and Statistics for Engineering and the Sciences" Brooks/Cole publishing Company, Monterey, California, 1982.

2 Arjun K Gaire , "Probability and Statistics for Engineering",Kathmandu

Marks distribution:

- There are two groups
- Group A will contain 5 questions from Chapter 1 to 4.
- Group B will contain 5 questions from Chapter 5 to 9.
- 10 questions will be asked.
- 8 to be attempted.
- Each question will carry equal marks.

Theory of Computation
BEG377CO

Year: III Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal		Final		Total
			Theory	Practical	Theory	Practical	
3	1	0	20	0	80	0	100

Course objectives

To provide the knowledge of automata, and to apply the concept of Context free language, and complexity theory

1. **Finite automata and regular expression** (7 hrs)
   - 1.1 Review of set theory
   - 1.2 Finite state system
   - 1.3 Non-deterministic finite automata
   - 1.4 NFA to DFA Conversion
   - 1.5 Regular expressions
   - 1.6 Arden's Theorem
2. **Properties of regular sets** (4 hrs)
   - 1.1 The pumping lemma for regular sets
   - 1.2 Closure properties of regular sets
   - 1.3 Decision algorithms for regular sets
3. **Context-free grammars** (6 hrs)
   - 3.1 Derivative trees
   - 3.2 Simplification of context-free grammars.
   - 3.3 Normal forms
4. **Pushdown automata** (4 hrs)
   - 4.1 Introduction
   - 4.2 Pushdown automata and context-free grammars.
5. **Properties of context-free languages (CFL)** (6 hrs)
   - 5.1 The pumping lemma for CFL's
   - 5.2 Closure properties of CFL's
   - 5.3 Decision algorithms for CFL's
6. **Turing Machines:** (5 hrs)
   - 6.1 Computable languages and functions.
   - 6.2 Church's hypothesis
7. **Undecidability** (5 hrs)
   - 7.1 Properties of recursive and recursively languages.
   - 7.2 Universal Turing machines and undecidable problem
   - 7.3 Recursive function theory
8. **Computational complexity theory** (4 hrs)

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(4 hrs)

9 Intractable problems
- 9.1 Computable languages and functions
- 9.2 NP-complete problems

References

1. R. McNaughton, "*Elementary Computability, Formal Languages and Automata*", Prentice Hall of India.
2. H.R. Lewis and C.H. Papadimitriou, "*Element of the theory of Computation*", Eastern Economy Edition, Prentice Hall of India.
3. E. Engeler, "*Introduction to the Theory of Computation*", Academic Press.
4. A.K pandey – Theory of Automata & formal languages

Marks Distribution:

Chapter	Marks
1	12
2	8
3	10
4	8
5	10
6	8
7	8
8	8
9	8
Total	80

$15 \times 6 =$
$6 \times 5 =$
$111 \times 23 =$
$333 \times 333 =$

$15x + 3y = 30$
$6x + 5y = 15$

Computer Network

BEG375CO

Year: III

Semester: II

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

Course Objective:

To be familiar with the basics of data communication, various types of computer networks, designing communication protocols and exposed to the TCP/IP protocol suit

1. Introduction to Computer Networks (4 hrs)

1.1 Definition, advantages, disadvantages, applications
1.2 Network structure and topologies
1.3 Network architecture and OSI model
1.4 Connection oriented and connectionless services
1.5 Network examples: Public network, APRNET

2. Local Area Networks (4 hrs)

2.1 LAN primer: Network server, Network workstation
2.2 NETWORK HARDERWARE: NIC, Cables, Hub, Storage, Backup, RAID, Local and Network Printers
2.3 LAN scheme: CSMA/CD and IEEE 802.3, Wireless LAN, IEEE 802.11x

3. Transmission and Channel Control: The Physical Layer (5 hrs)

3.1 Transmission media: Twisted pair, Coaxial, Fiber optic, Line-of-site, Satellite
3.2 Analog transmission: Telephone, Modem, RS 232
3.3 Digital transmission: PCM, Encoding
3.4 Channel allocation and switching: Multiplexing, Circuit switching, Packet switching

4. The Data Link Layer and Medium Access Sub-layer: (5 hrs)

4.1 Error detection and correction: CRC, Checksum, Hamming code
4.2 Sliding windows protocol: one-bit sliding, go back N, Selective repeat
4.3 IEEE standard 802 for LANs: 802.3, 802.4, 802.5
4.4 FDDI
4.5 Satellite Networks: SPADE, ALOHA

5. Internetworking (9 hrs)

5.1 Routing algorithms: Adaptive, Non-adaptive algorithms, Shortest path first, Flooding, Distance vector Routing, Link state routing
5.2 Congestion control algorithms: congestion prevention policies, congestion control in datagram subnet, warning bit, choke packet, Hop-by-hop choke packet, load shedding, jitter control, Leaky Bucket Algorithm, Token bucket algorithm
5.3 Bridges, Routers and Gateways

6. Overview of TCP/IP (10 hrs)

6.1 TCP/IP and the Internet

6.1.1. TCP/IP Features
6.1.2. Protocol Standards
6.2. A data communication model
6.3. TCP/IP protocol Architecture
6.4. Network Access Layer
6.5. Internet Layer
6.5.1. Internet Protocol
6.5.2. The Datagram
6.5.3. Routing Datagrams
6.5.4. Fragmenting Datagrams
6.5.5. Passing Datagrams to the Transport Layer
6.6. Internet Control Message Protocol
6.6.1. Flow control
6.6.2. Detecting unreachable destinations
6.6.3. Redirecting routes
6.6.4. Checking remote hosts
6.7. Transport Layer
6.7.1. User Datagram Protocol (UDP)
6.7.2. Transmission Control Protocol (TCP)
6.8. Application Layer
6.8.1. HTTP, FTP, SMTP, POP3, IMAP

7. **Delivering the Data** (4 Hr)
7.1. Addressing, Routing and Multiplexing
7.2. The IP Address
7.3. Address Depletion (Review)
7.4. Subnets
7.5. Address Resolution
7.6. Ports and Sockets

8. **Properties of secure communication** (4 Hr)
8.1. Cryptography (Substitution and Transposition cipher)
8.2. Cipher IV
8.3. Concept of digital signature

Laboratory Exercises

- Network cabling and Trouble Shooting
- Peer to Peer
- Client/Server network
- Primary Domain Controller (PDC)
- Backup Domain Controller (BDC)
- Resource Server (DNS, DHCP, File & Print Server)

Marking Sys

Chapter No.	M
1	
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3	
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References

1. D. [illegible] *Computer Networks*"
2. A. [illegible], "*Computer Networks*" Prentice Hall
3. C. Hunt "*TCP/IP Network Administration*" O'Reilly & Associates
4. Sam [illegible] *Hardware Bible*"
5. [illegible] "*Data and Computer Communication*", PHI