8th-semester - syllabus

Digital signal analysis and processing (Pokhara University)

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Digital Signal Analysis and Processing (3 – 1 – 2)

Evaluation:

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

Course Objectives:
1. To provide knowledge on digital signal processing techniques.
2. To design and implement IIR and FIR digital filter.

Course Contents:

1. **Signals, Systems and Signal Processing**   (5 hrs)
   1.1 Basic elements of Digital Signal Processing
   1.2 Energy signal, Power signal
   1.2 Need of Digital Signal Processing over Analog Signal Processing
   1.4 Sampling continuous signals and spectral properties of sampled signals.

2. **Discrete-time Signals and System**   (9 hrs)
   2.1 Elementary discrete-time signals
   2.2 Discrete time Fourier series and properties
   2.3 Discrete time Fourier transform and properties
   2.4 Discrete time system properties
   2.5 Properties of Linear Time-Invariant systems (LTI)
   2.6 LTI convolution sum characterized by constant coefficient difference equations
   2.7 Stability of LTI systems, Implementation of LTI system.
   2.8 Frequency Response of LTI systems

3. **Review of Z-Transform**   (4 hrs)
   3.1 Definition z-transform
   3.2 Convergence of Z-transform, Region of convergence
   3.3 Properties of Z-Transform (linearity, time shift, multiplication by exponential sequence, differentiation, time reversal, convolution, multiplication)
   3.4 Inverse z-transform-by long division, by partial fraction expansion

4. **Discrete Fourier Transform**   (8 hrs)
   4.1 Definition and application
   4.2 Frequency response of LTI system
   4.3 Forward and Reverse transform
   4.4 Properties of the Discrete Fourier Transform: linearity and Symmetry, time shift, frequency shift, duality, convolution, multiplication, conjugation & conjugate symmetry
   4.5 Basic concept of Fast Fourier Transform (FFT) algorithm

5. Discrete Filter Structure (6 hrs)

5.1 FIR filter overview

5.2 Structures for FIR Filter (direct, cascade, frequency sampling, lattice)

5.3 IIR Filter overview

5.4 Structure for IIR filter (direct form I & II, cascade, lattice, lattice ladder)

5.5 Quantization of filter coefficients and effects on location of poles, and zeros

6. FIR Filter Design (7 hrs)

6.1 Gibbs phenomena in FIR filter design

6.2 Filter Design by Window method (rectangular window, hanning window, hamming window)

6.3 Filter design by Kaiser window

6.4 Filter design by frequency sampling

6.5 Filter design using the Remez exchange algorithm

7. IIR Filter Design (6 hrs)

7.1 Filter design using low pass approximations Butterworth filter.

7.2 Filter design using impulse invariance method

7.3 Filter design using bilinear transformation

7.2 Properties of Chebyshev & Elliptic filters

7.3 High pass, Band pass and Notch filters.

Laboratory

1. Overview of DSP tools
2. Scaling, dynamic range and noise behavior of a recursive digital filter
3. Response of a non-recursive digital filter, Implementation in Impulse Invariant and Bilinear Transformation.
4. Bandpass filters implemented using cascade second order systems
5. Design of FIR filter
6. Design of IIR filter

Reference Books:

1. V. Oppenheim, *Discrete-Time Signal Processing,* Prentice Hall.
2. J. G. Proakis and D. G. Manolakis, *Digital Signal Processing,* Prentice Hall of India.
3. S. K. Mitra, *Digital Signal Processing, A Computer-based Approach,* McGraw Hill.

Social & Professional Issues in IT (2 – 1 – 0)

Evaluation:

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

Course Objectives:

The objective of this course is to provide the knowledge to handle social, professional and legal issues that arise in the professional working environment.

Course Contents:

1.	**History of Computing**	**4 hrs**

- 1.1. Prehistory of Computing
- 1.2. History of Computer Hardware
- 1.3. History of Software: Programming Languages and Operating Systems
- 1.4. History of Networking
- 1.5. Pioneers of Computing

2.	**Social Context of Computing**	**5 hrs**

- 2.1. Society and Technology
  - 2.1.1. Impact of Technology on Society and Vice Versa
  - 2.1.2. Using Technology for Poverty Alleviation
  - 2.1.3. Health Related Issues for an IT Professional
- 2.2. Internet and Society
  - 2.2.1. Digital Divide and Bridging the Digital Divide
  - 2.2.2. Governance of Internet
- 2.3. E-Governance and E-Government Systems

3.	**Computer Ethics and Ethical Theories**	**3 hrs**

- 3.1. Philosophical and Professional Ethics
- 3.2. Moral and Legal Issues
- 3.3. Descriptive and Normative Claims
- 3.4. Ethical Relativism
- 3.5. Utilitarianism and Deontological Theories
- 3.6. Rights

4.	**Professional Ethics**	**3 hrs**

- 4.1. Profession
  - 4.1.1. Job and Occupation
  - 4.1.2. Characteristics of Profession
  - 4.1.3. Engineering and Computing as a Profession
- 4.2. Professional Responsibilities and Rights

	4.2.1.	Conflict of Interests and Whistleblowing	
	4.3.	Professional Code of Ethics	
	4.3.1.	Code of Ethics of Nepal Engineering Council	
	4.3.2.	Code of Ethics of IEEE and ACM	
	4.4.	Hacker Ethics and Netiquette	

5.   **Risk and Responsibilities**   3 hrs

     5.1.   Computer Liability
        5.1.1.   Malfunction of Computers
        5.1.2.   Safety in Critical Systems
        5.1.3.   Accuracy vs. Democracy in Internet
        5.1.4.   Misinterpretation of Information and its Liability
     5.2.   Values in Design
        5.2.1.   Software and Design Problems
        5.2.2.   Hardware Design Issue
        5.2.3.   Elimination of Hardware
     5.3.   Professional Responsibilities of Computer Users
        5.3.1.   Responsibility and Accountability

6.   **Privacy**   3 hrs

     6.1.   Privacy and its Value
     6.2.   Privacy Risks
        6.2.1.   Government Information
        6.2.2.   Consumer Information
     6.3.   Privacy of Consumer Information
        6.3.1.   Databases and Personal Records
        6.3.2.   E-mail Privacy
        6.3.3.   Web Privacy
     6.4.   Protecting Privacy
     6.5.   Offensive Speech and Censorship in Cyberspace
     6.6.   Anonymity

7.   **Computer and Cyber Crimes**   4 hrs

     7.1.   Introduction to Computer Crime and Cyber Crime
     7.2.   Types of Computer Crimes
        7.2.1.   Traditional Computer Crimes and Software Piracy
        7.2.2.   Computer Frauds and Digital Forgery
        7.2.3.   Phishing
        7.2.4.   Unauthorized Access: Hacking, cracking
        7.2.5.   Denial of Service
        7.2.6.   Computer Invasion of Privacy
        7.2.7.   Harmful Content Crime
        7.2.8.   Online Pornography
        7.2.9.   Online Harassment
        7.2.10. Cyber Stalking and Online Scams
        7.2.11. Spams

        7.2.12. Malicious Programs: Viruses, Worms, Trojan Horses
        7.2.13. Cyber Terrorism
    7.3.   Introduction to Digital Forensics

8.   **Intellectual Property and Legal Issues**   **5 hrs**
    8.1.   Intellectual Properties
        8.1.1. Copyright
        8.1.2. Patent
        8.1.3. Design
        8.1.4. Trademark
        8.1.5. Trade-secrets
        8.1.6. IPR in Nepal: "Copyright Act", and "Patent, Design and Trademark Act"
    8.2.   IT Related Laws in Nepal
        8.2.1. IT Policy of Nepal
        8.2.2. Right to Information Act
        8.2.3. Electronics Transaction Act and Rules
        8.2.4. Secure Password Practices Issued by GoN

Text Books:

1. Johnson, D. G., *Computer Ethics*, Pearson Education Asia, Third Edition, 2001, ISBN: 81-7808-306-X.
2. IT Policies, Laws and Acts of the Government of Nepal. Available at: www.lawcommission.gov.np and www.cca.gov.np

Reference Books:

1. Hussain, K. M., and Hussain, D. S., *Computers; Technology, Applications, and Social Implications*, PHI, New Delhi, ISBN: 81-203-0620-1.
2. Sara Baase, *A Gift of Fire: Social, Legal, and Ethical Issues for Computers and the Internet*, latest Edition, Prentice Hall
3. Articles collected from various Journals and Periodicals, such as IEEE-Computer, BYTE, ACM Periodicals, etc.
4. IT Policies and Laws of the local government
5. International IT Policies and Laws (Source: ISO, SEI, IEEE, etc.)

Information Systems (3 – 0 – 2)

Evaluation:

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

Course Objectives:

The objective of this course is to introduce and apply the knowledge of computer based information systems. It also provides the concept to the student in designing and setting up complex information system.

Course Contents:

1. Information System   3 hrs
      1.1. Classification and evolution of IS
      1.2. IS in functional area.
      1.3. Information system architecture
      1.4. Qualities of information systems
      1.5. Managing Information System resources
      1.6. Balanced Scorecard – case studies

2. Control, Audit and Security of Information System   3 hrs
      2.1. Control of information system
      2.2. Audit of information system
      2.3. Security of information system
      2.4. Consumer layered security strategy
      2.5. Enterprise layered security strategy
      2.6. Extended validation and SSL certificates
      2.7. Remote access authentication
      2.8. Content control and policy based encryption
      2.9. Example of security in e-commerce transaction

3. Enterprise Management Systems   8 hrs
      3.1. Enterprise management systems (EMS)
      3.2. Enterprise Software: ERP/SCM/CRM
      3.3. Information Management and Technology of Enterprise Software
      3.4. Role of IS and IT in Enterprise Management
      3.5. Enterprise engineering, Electronic organism, Loose integration vs. full Integration, Process alignment, Frame work to manage integrated Change, future trends.

4. Decision Support and Intelligent Systems   7 hrs
      4.1. DSS, operations research models
      4.2. Group decision support systems

4.3. Enterprise and executive decision support systems
4.4. Knowledge Management, Knowledge based Expert system
4.5. AI, Neural Networks, Virtual reality, Intelligent Agents
4.6. Data mining, Data ware Housing, OLAP, and OLTP
4.7. Anomaly and fraud detection

5. Planning for IS   3 hrs
5.1. Strategic information system
5.2. Tactical information system
5.3. Operational information systems

6. Implementations of Information Systems   9 hrs
6.1. Change Management
6.2. Critical Success Factors
6.3. Advanced Balanced scorecard
- Advanced strategic foundations development
- Advanced objective & strategy map development
- Advanced performance management
- Implementation & visualization
- Strategic initiative prioritization & management
- Advanced scorecard alignment & cascading
- Dashboard

7. Web Based Information System and Navigation   6 hrs
7.1. The structure of the web
7.2. Link Analysis
7.3. Searching the web
7.4. Navigating the web
7.5. Web uses mining
7.6. Collaborative filtering
7.7. Recommender systems
7.8. Collective intelligence

8. Scalable and Emerging Information System Techniques   6 hrs
8.1. Techniques for voluminous data
8.2. Cloud computing technologies and their types
8.3. Map Reduce and Hadoop systems
8.4. Data management in the cloud
8.5. Information retrieval in the cloud
8.6. Link analysis in cloud setup
8.7. Case studies of voluminous data

Practical:
The practical exercise shall include following three types of projects ondesigning of information system

1. E-commerce based information system for online transaction processing

2. Web uses mining or collaborative filtering based processing system
3. Scalable and emerging information system
4. Balanced scorecard, Strategy Map

References:
1. Information Systems Today Leonard Jessup and Joseph Valacich, Prenticehall, 2007
2. Managing with Information System, J. Kanter, PHI, Latest edition
3. An Introduction to Search Engines and Web Navigation, M. Levene, Pearson Education,
4. Data-Intensive Text Processing with Map Reduce, Jimmy Lin and Chris Dyer, Morgan and Claypool, 2010.
5. The Cloud at Your Service, Jothy Rosenberg and Arthur Mateos, Manning, 2010
6. Balanced scorecard: Robert S. Kaplan, David P. Norton
7. Strategy Maps: Converting intangible assets into tangible outcomes, Robert S. Kaplan, David P. Norton
8. Strategy Focused organization: Robert S. Kaplan, David P. Norton

Organization and Management (2-0-0)

Evaluation:

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

Course Objectives:

To make the students able to understand and analyze the professional environment where they have to practice their profession. This course will also help them in bringing attitudinal as well as behavioral change.

Course Contents:

1   Introduction   (2 hrs)
1.1 Meaning and concept of management
1.2 Functions of management
1.3 Scope and application of management
1.4 Importance of management

2   Organization   (4 hrs)
2.1 Meaning and concept of organization
2.2 Characteristics of organization
2.3 Principles of organization
2.4 Formal and informal organizations
2.5 Organization chart
2.6 Types of organization-line
    2.6.1 Line and staff
    2.6.2 Functional and matrix.
2.7 Authority and responsibility and their interrelationships.

3   Motivation and Leadership   (6 hrs)
3.1 Concept of motivation
3.2 Incentives
3.3 Theories of motivation: Need hierarchy, Dual Factoral, Expectancy and Achievement theories.
3.4 Leadership styles: Participative management, Management by objectives, management by exception,
3.5 Learning organizations

4   Human Resource Management   (6 hrs)
4.1 Meaning and functions of human resource management
4.2 Recruitment
4.3 Job analysis, Job specification, Job description
4.4 Elements of compensation

4.5 Human resource development: Training (on the job and off the job)
4.6 Performance appraisal

5   Introduction to Industrial Relations   **(6 hrs)**
5.1 Meaning of Industrial Relations
5.2 Trade union
    5.2.1 Collective bargaining
    5.2.2 Trade union movement in Nepal
5.3 Employee grievances
5.4 Employee Discipline
5.5 Employee health and safety
5.6 Compensation and its relation with industry
5.7 Challenges of industrial relations in Nepal
5.8 Methods of improving industrial relations in Nepal

6   Human Behavior and Conflict Management   **(7 hrs)**
6.1 Concept of Human Behavior and Conflict Management
6.2 Types of Conflict Management
6.3 Conflict Management and its impact to the HRM
6.4 Modes of Conflict Management
    6.4.1 Negotiation
    6.4.2 Facilitation
    6.4.3 Mediation
    6.4.4 Arbitration
    6.4.5 Legal action

References:
1. Harold Koontz and Heinz Weihrich, Essentials of Mangement
2. Govinda Ram Agrawal, Organization and Management in Nepal.
3. C.B Mamoria, Personnel Managemnt
4. Fred Luthans Organizational Behavior, (McGraw Hill)