

ENGINEERING PROFESSIONAL PRACTICE CE 752

Lecture : 2
Tutorial : 0
Practical : 0

Year : IV
Part : II

Course Objective:

To familiarize the students with their roles in the society, ethical and legal environment in which engineering is practiced, contract administration, regulatory environment and contemporary issues in Engineering.

1. **History of Engineering Practices** [3 hours]
 - 1.1. Man and Society
 - 1.2. Technology and Society
 - 1.3. History of Engineering Practice in Eastern Society
 - 1.4. History of Engineering Practice in Western society
 - 1.5. Engineering Practices in Nepal
2. **Profession and Ethics** [6 hours]
 - 2.1. Profession: Definition and Characteristics
 - 2.2. Professional Institutions
 - 2.3. Relation of an Engineer with Client, Contractor and Fellow Engineers
 - 2.4. Ethics, Code of Ethics and Engineering Ethics
 - 2.5. Moral Dilemma and Ethical Decision Making
 - 2.6. Detailed Duties of an Engineer and Architect
 - 2.7. Liability and Negligence
3. **Professional Practices in Nepal** [3 hours]
 - 3.1. Public Sector practices
 - 3.2. Private Sector Practices
 - 3.3. General Job Descriptions of Fresh Graduates in both Public and Private Sector
4. **Contract Management** [6 hours]
 - 4.1. Methods of work execution/contracting
 - 4.2. Types of Contracts
 - 4.3. Tendering Procedure
 - 4.4. Contract agreement

5. **Regulatory Environment** [5 hours]
 - 5.1. Nepal Engineering Council Act
 - 5.2. Labor Law
 - 5.3. Intellectual Property Right
 - 5.4. Building Codes and Bylaws
 - 5.5. Company Registration

6. **Contemporary Issues in Engineering** [3 hours]
 - 6.1. Globalization and Cross Cultural Issues
 - 6.2. Public Private Partnership
 - 6.3. Safety, Risk and Benefit Analysis
 - 6.4. Development and Environment
 - 6.5. Conflict and Dispute Management

7. **Case Studies based on Engineering Practices** [4 hours]

This should more focus on the relevant department basis.

References:

1. Carson Morrison and Philip Hughes "Professional engineering Practice – Ethical Aspects", McGraw-Hill Ryerson Ltd.' Toronto 1982
2. Dr Rajendra Adhikari, "Engineering Professional Practice – Nepalese and international Perspectives" Pashupati Publishing House, Kathmandu Nepal 2010
3. M. Govindarajan; S Natarajan and V.S. Senthikumar., " Engineering Ethics" – PHI Learning Pvt. Ltd. New Delhi 2009
4. Nepal Engineering Council Act
5. Contract Act
6. Labor Act
7. Company Act
8. Copyright Act
9. Public Procurement Act
10. Building By-Laws

Evaluation Scheme:

The questions will cover all the chapters in the Syllabus. The evaluation scheme will be as indicated in the table below.

Chapter	Hours	Marks distribution *
1	3	4
2	6	8
3	3	4
4	6	8
5	5	6
6	3	4
7	4	6
Total	30	40

* There may be minor deviation in marks distribution.

INTERNET AND INTRANET CT 754

Lecture : 3
Tutorial : 1
Practical : 1.5

Year : IV
Part : II

Course Objectives:

The focus of this course is on the practical application of internetworking technologies to private intranets for information management and public internets for electronic commerce students will learn theoretical details, strategies for designing sites, techniques for creating their technical infrastructures, methods for developing content, and techniques for site deployment and management. Students will develop various intranet and internet applications and setup servers as part of practical session.

- 1. Introduction [5 hours]**
 - 1.1. History and Development of Internets and Intranets
 - 1.2. IANA, RIR/NIR/LIR and ISPs for internet number management
 - 1.3. Internet Domain and Domain Name System
 - 1.4. Internet Access Overview
 - 1.5. Internet Backbone Networks: Optical Backbone, Marine Cables, Teleports, Satellite and Terrestrial Links
- 2. Internet Protocol Overview [6 hours]**
 - 2.1. TCP/IP and the IP Layer overview
 - 2.2. IPv4 and IPv6 Address Types and Formats
 - 2.3. IPv4 and IPv6 Header Structure
 - 2.4. Internet RFCs
- 3. Protocols and Client/Server Applications [6 hours]**
 - 3.1. Standard protocols: SMTP, E-mail Message (RFC22),PGP, POP, IMAP, HTTP, FTP
 - 3.2. N-Tiered Client/Server Architecture
 - 3.3. Universal Internet Browsing
 - 3.4. Multiprotocol Support
- 4. HTTP and the Web Services [8 hours]**
 - 4.1. HTTP, Web Servers and Web Access
 - 4.2. Universal naming with URLs

- 4.3. WWW Technology: HTML, DHTML, WML, XML
- 4.4. Tools: WYS/WYG Authoring Tools
- 4.5. Helper applications: CGI; PERL, JAVA, JAVA SRIPTS, PHP, ASP, .NET Applications
- 4.6. Introduction to AJAX (Programming)
- 4.7. browser as a rendering engine: text, HTML, gif and jpeg

- 5. Designing Internet Systems and Servers [8 hours]**
 - 5.1. Designing of Internet System Network Architecture
 - 5.2. Choice of platforms
 - 5.3. Server Concepts: WEB, Proxy, RADIUS, MAIL
 - 5.4. Cookies
 - 5.5. Load Balancing: Proxy Arrays
 - 5.6. Server Setup and Configuration Guidelines
 - 5.7. Security and System Administration Issues, Firewalls and Content Filtering
- 6. Internet and Intranet Systems Development [6 hours]**
 - 6.1. Introductions
 - 6.2. Benefits and drawbacks of intranets
 - 6.3. Protocols, Structure and Scope of Networks
 - 6.4. Intranets Resource Assessments: Network Infrastructure, Clients and Server Resources
 - 6.5. Intranet Implementation Guidelines
 - 6.6. Content Design, Development, Publishing and Management
 - 6.7. Intranet Design with Open source Tools: DRUPAL, JUMLA
 - 6.8. Tunneling Protocols: VPN
- 7. Internet and Intranet Applications [6 hours]**
 - 7.1. General Applications: Email, WWW, Gopher, Online Systems
 - 7.2. Multimedia and Digital Video/Audio Broadcasting: Video/Audio Conferencing, Internet Relay Chat (IRC)
 - 7.3. Broadband Communications, Policy, xDSL and Cable Internet
 - 7.4. VoIP, FoIP and IP Interconnection
 - 7.5. Datacenters and Data warehousing, packet clearing house
 - 7.6. Unified Messaging Systems
 - 7.7. Fundamental of e-Commerce
 - 7.8. Concept of Grid and Cloud Computing

Practicals

- Lab1: Web programming Skill (HTML, PHP, ASP..) and WEB development Tools.
- Lab2, 3, 4: Web Programming with DB Connection and Ajax programming.
- Lab5,6: Internet & Intranet Site Development (personal/corporate web development)
- Lab 7: Web & DNS Server Installation, Configuration and Hosting.
- Lab8: presentation of project work developed on lab 5, 6 & 7.

References

1. Computer Networks; Andrew S. Tanenbaum, Prentice Hall
2. Internet and Intranet Engineering; Daniel Minoli, mGraw-Hill
3. Internetworking with TCP/IP; Comer, D.E and Stevens
4. RFC 821/822/1543/1738/2068

Evaluation Scheme:

The questions will cover all the units of the syllabus. The evaluation scheme will be as indicated below:

Chapter	Hour	Marks Distribution*
1	5	10
2	6	10
3	6	10
4	8	15
5	8	15
6	6	10
7	6	10
Total	45	80

SIMULATION AND MODELING

CT 753

Lecture : 3
Tutorial : 1
Practical : 1.5

Year : IV
Part : II

Course objectives:

To provide the knowledge of discrete and continuous system, random numbers generation, queuing system and computer system simulation.

- 1. Introduction to Simulation (4 hours)**
 - 1.1 system, model and simulation
 - 1.2 Discrete and continuous systems
 - 1.3 Model of a system
 - 1.4 Types of models
 - 1.5 Steps in simulation study
 - 1.6 Model development life cycle
 - 1.7 Advantage and disadvantage of simulation
 - 1.8 Limitations of the simulation techniques
 - 1.9 Areas of application
- 2. Physical and Mathematical models (4 hours)**
 - 2.1 Static physical model
 - 2.2 Dynamic physical model
 - 2.3 Static mathematical models
 - 2.4 Dynamic mathematical models
- 3. Continuous system simulation (5 hours)**
 - 3.1 Differential and partial differential equations
 - 3.2 Continuous system models
 - 3.3 Analog computer
 - 3.4 Analog Methods
 - 3.5 Hybrid simulation
 - 3.6 Digital-Analog simulators
 - 3.7 Continuous System simulation languages(CSSLs)
 - 3.8 Feedback systems
- 4. Queuing system (6 hours)**
 - 4.1 Elements of queuing system
 - 4.2 Characteristics of queuing systems

- 4.3 Model of queuing system
- 4.4 Types of queuing system
- 4.5 Queuing notation
- 4.6 Measurement of system performance
- 4.7 Network of queues
- 4.8 Applications of queuing system

- 5. Markov chains (3 hours)**
 - 5.1 Key features of Markov chains
 - 5.2 Markov process with example
 - 5.3 Application of Markov chain
- 6. Random Number (10 hours)**
 - 6.1 Properties of Random Numbers
 - 6.2 Generation of Pseudo-Random numbers
 - 6.3 Random Number generation methods
 - 6.4 Test for random numbers
 - 6.5 Generating discrete distribution
 - 6.6 Inversion, rejection , composition and Convolution
- 7. Verification and validation of simulation models (3 hours)**
 - 7.1 Verification and validation
 - 7.2 Verification of simulation models
 - 7.3 Calibration and validation of models
- 8. Analysis of simulation output (4 hours)**
 - 8.1 Estimation methods
 - 8.2 Simulation run statistics
 - 8.3 Replication of runs
 - 8.4 Elimination of Initial bias
- 9. Simulation software (3 hours)**
 - 9.1 simulation in Java
 - 9.2 simulation in GPSS
 - 9.3 Simulation in SSF
 - 9.4 Other simulation software
- 10. Simulation of computer systems (3 hours)**
 - 10.1 Simulation tools
 - 10.2 High Level computer –system simulation
 - 10.3 CPU simulation
 - 10.4 Memory Simulation

Practicals:

1. Simulation of continuous system
2. Simulation of the R-C amplifier circuit
3. Generation of Random number
4. Simulation mass spring damper system
5. Simulation of National econometric system

References:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, Devid M. Nicol, P. Shahabudeen: Discrete-Event system simulation
2. Geoffrey Gordon: System Simulation
3. A.M. Law and W.D. Kelton: Simulation and Modeling and analysis
4. R. Y. Rubinstein, B. Melamed: Modern Simulation and Modeling
5. S. Shakya: Lab Manual on Simulation and modeling

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks Distribution *
1	4	8
2	4	6
3	5	10
4	6	10
5	3	6
6	10	18
7	3	5
8	4	5
9	3	6
10	3	6
Total	45	80

*There may be minor variation in marks distribution.

INFORMATION SYSTEMS CT 751

Lecture : 3
Tutorial : 0
Practical : 1.5

Year : IV
Part : II

Course Objectives:

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.

- 1. Information system (3 hours)**
 - 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 (5 hours)**
 - 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 (4 hours)**
 - 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 hours)**
 - 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, OLTP
 - 4.7. Anomaly and fraud detection
- 5. Planning for IS (3 hours)**
 - 5.1. Strategic information system
 - 5.2. Tactical information system
 - 5.3. Operational information systems
- 6. Implementations of Information Systems (7 hours)**
 - 6.1. Change Management
 - 6.2. Critical Success Factors
 - 6.3. Next generation Balanced scorecard
- 7. Web based information system and navigation (8 hours)**
 - 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 (8 hours)**
 - 8.1. Techniques for voluminous data
 - 8.2. Cloud computing technologies and their types
 - 8.3. MapReduce 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 environment

Practicals:

The practical exercise shall include following three types of projects on designing 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, Prentice hall, 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 MapReduce, 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

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks Distribution*
1	4	8
2	8	14
3	4	8
4	7	12
5	3	5
6	3	5
7	8	14
8	8	14
Total	45	80

*There may be minor variation in marks distribution.