

Year:IV**Semester: I**

Course Code	Course Title	Credits	Lecture (Hrs.)	Tutorial (Hrs.)	Laboratory (Hrs.)	Total(Hrs.)
BIT401CO	Network Programming	3	3	1	2	6
BIT402CO	Digital Governance	3	3	1		4
BIT4**	Specialization1	3				
BIT4**	Specialization2	3				
BIT403CO	Internship	3				
	Total	15				

Year: IV**Semester: II**

Course Code	Course Description	Credits	Lecture (Hrs.)	Tutorial (Hrs.)	Laboratory (Hrs.)	Total(Hrs.)
BIT451MS	Principles of Management and Entrepreneurship in IT	3	3	1		4
BIT452CO	Distributed and Cloud Computing	3	3	1	2	6
BIT4**	Specialization-3	3				
BIT4**	Specialization-4	3				
BIT453CO	Apprentice Project	3				6
	Total	15				

Rethalur

****Specialization Area:**

Specialization area courses have been designed in three major areas for in-depth knowledge in the area. Students develop specialized expertise in their specialization area. Students are required to take four specialization courses, two courses each in seventh and eight semester, from a selected area of specialization. Currently, three specialization areas(Intelligent Systems and Business Analytics, E-Commerce and Web Application Development, and Climate Change Management)are offered to the students.

A. Intelligent Systems and Business Analytics

Year: IV and Semester: I (Specialization1andSpecialization2)

BIT421CO: Machine Learning

BIT422CO: Business Intelligence and Data Science

BIT423CO: Deep Learning

Year: IV and Semester: II (Specialization 3 and Specialization 4)

BIT471CO: Natural Language Processing

BIT472MS: Supply Chain Analytics

B: Digital Commerce and Mobile application Development

Year: IV and Semester: I (Specialization1andSpecialization2)

BIT428CO: Digital Commerce

BIT429CO: Multimedia and Application

Year: IV and Semester: II (Specialization 3 and Specialization 4)

BIT478CO: Big Data

BIT479CO: Mobile App development

C: Climate Change Management

Year: IV and Semester: I (Specialization 1 and Specialization 2)

BIT435CO: GIS

BIT436CO: Remote Sensing

BIT437CO: Data Center and Disaster Recovery Center

Year: IV and Semester: II (Specialization 3 and Specialization 4)

BIT485CO: Incident Response and Management System

BIT486CO: Climate Change Risk Management

BIT487CO: Disaster Governance

Network Programming
BIT401CO

Year: IV

Semester: I

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 objectives:

At the end of this course, students will be able to design and implement network client server applications.

Course Contents:

Unit 1: Introduction to network programming [5 Hrs]

Introduction to computer network: client/server model, Protocol Suite (ISO/OSI, TCP/IP), Unix Standards (POSIX, OpenGroup, IETF), Network Utilities (telnet, route, ipconfig, ifconfig, ping, netstat, And ftp) Introduction to programming: wrapper functions, header files, libraries and ports numbers, IP address. Iterative server, concurrent server, networked servers.

Unit 2: Elementary operating system calls [6Hrs]

System call, program, thread, process, Kernel, fork(), exec() and its family, waitpid(), wait(), pipe(), Fifo(), signals (SIGCHLD, SIGINT, SIGIO). IPC Names, creating and opening IPC channels, IPC names, creating and opening IPC channels, IPC permissions

Unit 3: TCP/UDP transport layer protocols [4Hrs]

TCP (Transmission Control Protocol): features, connection establishment and termination, states in communication (LISTEN, TIME_WAIT, ESTABLISHED, BLOCKED) UDP (user datagram protocol): features, uses, comparison with TCP. TCP and UDP buffer sizes and limitations. SCTP

Unit 4: Elementary socket calls [5Hrs]

Socket address structure: for IPV4, IPV6, UNIX domain socket and generic socket address structure, value-result argument. Byte ordering and manipulating function: htonl(), htons(), ntohl(), ntohs(), inet_addr(), inet_aton(), inet_ntoa(), inet_pton()

Unit 5: Elementary TCP-UDP socket [6Hrs]

Socket(), connect(), bind(), listen(), accept(), read(), write(), close(), sendto(), recvfrom(),

- Unit 6: I/O multiplexing** [4Hrs]
Introduction, I/O models: blocking I/O, non-blocking I/O, I/O multiplexing, signal driven I/O (SIGIO) and asynchronous I/O model. Select(), poll(), shutdown()
- Unit 7: Socket options** [2Hrs]
Get sock opt() and set sockopt() functions, IPV4, IPV6, TCP socket options
- Unit 8: Name and address conversion** [2Hrs]
Domain name system, gethostbyname(), gethostbyaddr(), uname(), getservbyname() and getservbyport(), gethostname() functions, socket timeouts
- Unit 9: Unix domain protocol** [3Hrs]
Introduction, Unix domain socket address structure, socket pair function, Unix domain stream client-server, UNIX domain datagram client/server
- Unit 10: Daemon processes, Inetd superservers** [2 Hrs]
Introduction, Sysloged (syslogfunction), daemon_initfunction, inetd daemon
- Unit 11: Broadcast and multicast** [3Hrs]
Introduction, Broadcast and multicast addresses, comparison between broadcast, unicast and multicast socket options, Unicast versus Broadcast, multicast versus broadcast on LAN
- Unit 12: IP layers and raw socket** [3Hrs]
Introduction, raw socket creation, input and output (ping example)

Laboratory Work:

There shall be lab strictly using c/c++/Java/Linux

- Linux commands
- IPC(Pipe(), Fifo(), MessageQueue)
- TCP, UDP and Unix Domain socket client server program
- TCP echo server and client program
- Fork() System call
- Wait() and waitpid() systemcall
- Uname(), gethostbyaddr(), gethostbyname(), gethostname() system call
- Shell programming

ReferenceBooks:

- Stevens W.R., “*Unix Network Programming*”, Vol-1
- Stevens W.R., “*Unix Network Programming*”, Vol-II
- Doglous E. Comer, “*Internetworking with TCP/IP*”, Vol-III

Digital Governance
BIT402CO

Year: IV

Semester: I

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

Course Objectives:

This course provides the implementation and management of e-Government from the technicalities of data flows and process mapping to the policies of e-government and also provides the case studies of different countries. It also familiarizes students with the knowledge of Digital governance in relation to Digital Democracy, Citizen Relationship management and application of Artificial Intelligence.

Course Contents:

Unit 1: Introduction

[3Hrs]

- 1.1. e-Government and e-Governance.
- 1.2. e-Government as information system.
- 1.3. Benefits of e-Government.
- 1.4. e-Government stages of development.
- 1.5. Online service delivery and electronic service delivery.

Unit 2: Public-Private Partnership for e-Government

[4Hrs]

- 2.1. G2C Project
- 2.2. G2B Project
- 2.3. PPP Forms-JV Model, BOO Model, BOOT model, ASP model
- 2.4. Issues in PPP for e-Government
- 2.5. Citizen-centric approach to e-Government.

Unit 3: ICT Infrastructure for e-Government [3 Hrs]

3.1 Network infrastructure.

3.2 Computing Infrastructure.

3.3 Data centers

3.4 E-Government architecture.

3.5 Interoperability framework.

Unit 4: e-Government Readiness [4Hrs]

4.1 e-Readiness framework

4.2 Steps to e-Government readiness.

4.3 Issues in e-Government readiness.

Unit 5: Security for e-Government [5Hrs]

5.1 Challenges of e-government security.

5.2 An approach to security for e-Government.

5.3 Security management model.

5.4 e-Government security architecture.

5.5 Security standards.

Unit 6: Implementing e-Government [5Hrs]

6.1 e-Government system life cycle and project assessment

6.2 Analysis of current reality

6.3 Design of new e-Government system.

6.4 E-Government risk assessment and mitigation.

6.5 E-Government system construction.

6.6 Implementation and beyond

6.7 Developing e-Government hybrids.

Unit 7: From Representative to Digital Democracy [3 Hrs]

7.1 Using Internet to increase Political Participation

7.2 Online Participation and Political Organization

7.3 Elections

7.4 Protecting Democracy

Unit 8: Citizen-Centric Remote Online Digital Governance

[3Hrs]

8.1 Citizen Relationship Management and Digital Governance

8.2 Responding to citizens online

8.3 From Electronic communication to Modernizing Government

Unit 9: Applying Artificial Intelligence to improve Performance and Results [4 Hrs]

9.1 Accessing the Impact of Artificial Intelligence on Performance

9.2 Artificial Intelligence, Bias, Facial, and Voice recognition

Unit 10: Case Studies and Applications of e-government system

[10Hrs]

10.1 Nepal: Cyber Laws, ICT development project, Government Integrated Data Center (GIDC), e-Government master plan, Human resource management software.

10.2 India: Community information centers, e-Procurement in the government of Andhra Pradesh, e-Suvida.

10.3 Other Countries: E-Government development in South Korea, e-Government in China, e-Government in Brazil, Sri Lanka, Singapore, USA.

Reference Books:

1. Implementing & Managing e-Government, Richard Heeks
2. e-Governance: Concepts & Case Studies, C. S. R. Prabhu, Prentice Hall of India
3. e-Government, J. Satyanarayana, Prentice Hall of India
4. Digital Governance: Applying Advanced Technologies to Improve Public Services, Michael E. Milakovich, Routledge Taylor & Francis Group

**Internship
BIT403CO**

Year: IV

Semester: I

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

Course Synopsis:

The students are required to complete a three credit 3 (45 hour) internship as a part of the course requirement. Business organization is a crucial requirement of the Internship course and this will have to be secured before getting started with the course. The work that the students perform during the Internship will have to be supervised by the faculty members the internship experience is expected to enable the students to assist in the resolution of complex problem associated with Database systems.

At the end of the Internship, the student(s) are required to write a report on their internship work. Such a report needs to be structured according to the prescribed format. The Report forms a major aspect of the evaluation of the Internship work.

Goal:

Main goal is to assist students in focusing their interests, thus aiding in their professional carrier. It gives students the opportunity to re-examine their career objectives and explore the variety of opportunities in the field of computer application.

Preparation Students, the advisors, and the organization, with which the student team is affiliated, will have to agree on a problem that needs to be addressed during the internship. An internship is designed by the advisor and the student according to mutual interests, needs and availability of related organization. To develop a rewarding program, at the beginning of the internship, the advisor and student are asked to establish an internship plan, in the form of written objectives and goals, and to develop a strategy for attaining those goals. The plan may include a schedule of activities that need to be carried out in order to reach a solution for the problem being addressed. The internship plan is not intended to be rigid. Advisor may be unable to assess certain responsibilities until the student demonstrates his or her ability. The plan should be flexible and subject to revision. The advisor and student should assess the student's progress throughout the term of the internship both to evaluate the student's performance, and to establish new directions as needed.

Role of the Advisor:

Advisors are expected to share their experience, insight, and enthusiasm with the student throughout the internship. They should continually monitor the progress of the student, assessing written and oral communications and guiding the development of the student's technical and managerial skills, effectiveness and presentation of self. Advisors are expected to submit a post-internship evaluation of the student's accomplishments and abilities and of the internship program in general.

Role of the Student:

In order for the internship to be a mutually beneficial experience, a student should begin with a definition of his/her objectives and specific interests for of 45 hour period to ensure that appropriate activities and projects are selected by the advisor and the student. The student will be responsible for the timely completion and professional quality of all activities and projects assigned. The student is expected to speak frequently with the advisor on his/her progress and interest in other projects, as well as to discuss observations and questions about meetings, projects and other activities with which he/she is involved. The student is required to submit to Advisor, within the first two weeks of the internship, a brief plan for the internship.

Internship Group Size and document preparation:

Each group must be of maximum 3 Students.

Each student should prepare Individual document on the basis of his/her part in the group project.

Supervisors must be assigned to each group.

Domain/Scope of Internship (Project Implementation /Research) :

- Bank
- Hospitals
- Software Companies
- NTC, Ncell and other Telecommunication Sectors
- Government Organizations (IT Related) etc.

Report Format:

APA Format

Tentative Contents of Report:

- Abstract
- Introduction (organization +Work Done)
- Statement of the problem and Objective
- Literature Review and methodology (Optional)
- System Analysis
- System Design
- Implementation
- System Testing
- Limitation/future enhancement
- Conclusion
- References and Bibliography

Evaluation Criteria:

Proposal Defense: 10% weight {Evaluated by Supervisor and Mentor}

Mid-Term: 30% weight {Evaluated by Supervisor and Mentor}

End-Term: 60% weight.

Proposal Defense (At beginning of the internship):

- Topic Selection with Proposal (5 of total)
- Presentation (5% of total).

Mid-Term (After 2 month):

- Program Design (10% of total)
- Demo Presentation (10% of total).
- Viva (10% of total)

End-Term (After Completion of internship and before final Exam) :

- Depth of work (15% of total)
- Report (25% of total)
- Viva (10% of total)
- Presentation (10% of total)

Note: External examiner assigned from Purbanchal University (Dean Office, Faculty of Science & Technology). Students will be present in final presentation along with External Examiner and Supervisors.

Machine Learning BIT421CO

Year: IV

Semester: I

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

Objective: The main objective of the course is to provide both theoretical concepts and practical knowledge of machine learning.

Contents:

Unit 1: Introduction to Machine Learning

[5 Hrs]

Introduction, Components of Learning, Learning Models, Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Designing a Learning System, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Frameworks for building Machine Learning System

Unit 2: Supervised Learning:

[12Hrs]

Regression: Linear Regression, Non-Linear Regression, and Model Evaluation Method

Classification: Logistic Regression, Support Vector Machine, K-Nearest Neighbors Methods

Decision Tree Technique- Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning

Unit 3: Unsupervised Learning:

[4Hrs]

Introduction to clustering, K-means clustering, K-mode clustering

Unit 4: Model Diagnosis and Tuning:

[7 Hrs]

Bias and Variance, K-Fold Cross-Validation, Random Forests

Unit 5: Text mining:

[6 Hrs]

Text mining process overview, Text assemble, Text Preprocessing, Text Assemble, Text Exploration,

Unit 6: Deep Learning

[11Hrs]

Artificial Neural Network, Feed Forward Neural Network with back propagation, Convolution Neural Network, Recurrent neural network

Laboratory Work:

Laboratory work consists of the following laboratory exercises using Python.

1. Introduction to Python, Python Libraries- Numpy, Pandas, Matplotlib, Scikit

2. Perform Data exploration and preprocessing in Python
3. Implement Linear regression
4. Implement logistic regression
5. Build models using Decision trees
6. Implement K-NN algorithm to classify a dataset
7. Implement a sklearn multilayer perceptron classifier
8. Using WEKA for classification, clustering and regression

Reference Books:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education
2. Mastering Machine Learning with Python in six steps. A practical Implementation Guide to Predictive Data Analytics Using Python. Authors: Swamynathan Manohar
3. Muller Andreas and Sarah Guidos, Introduction to Machine Learning with Python: A guide for data scientists,
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, springer series instatistics.
5. EthemAlpaydm, Introduction to machine learning, second edition, MITpress.

**Business Intelligence and Data Science
BIT422CO**

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

Course Objective:

The main objective of this course is to provide to students foundation in Business Intelligence and Data Science techniques and their applications. The course will also provide skills in using specific software tools for developing BI applications.

Course Contents:

Unit 1: An Overview of Business intelligence, Analytics and Decision Support [6 Hrs]

Changing Business Environments and Computerized Decision Support; Framework for Business intelligence (BI); Intelligence Creation, Use, and BI Governance; Transaction Processing versus Analytic Processing; Successful BI Implementation; Analytics Overview

Unit 2: Data Ware Housing [6 Hrs]

Data Ware Housing (DW) Definitions and Concepts; DW Process Overview, Architectures; Data Integration, and the Extraction, Transformation and Load (ETL) Processes; DW Development; DW Implementation Issues; Real Time DW; and DW Administration, Security Issues and Future Trends.

Unit 3: Business Reporting, Visual Analytics and Business Performance Management [6 Hrs]

Business Reporting Definitions and Concepts; Data and Information Visualization; Different Types of Charts and Graphs; Emergence of Data Visualization and Visual Analytics; Performance Dash Boards; Business Performance Management; Performance Measurement; Balanced Score Boards; and Six Sigma as a Performance Measurement System; Using Tableau and Power BI for data visualization

Unit 4: Data Mining [9 Hrs]

Data Mining (DM) Concepts and Applications; DM Processed Methods Software Tools; and DM Privacy Issues; Using WEKA tools for data mining

Unit 5: Text and Web Analytics: [6 Hrs]

Text Analytics (TA) and Text Mining (TM) Overview; Natural Language Processing; TM Applications' Process; Sentiment Analysis; Web Mining (WM) Overview; Search Engines; Web Usage Mining (Web Analytics); and Social Analytics

Unit 6: Big Data Analytics:**[5 Hrs]**

Definition of Big Data; Fundamentals of Big Data Analytics; Big Data Technologies; Data Scientist; Big Data and Warehousing; Big Data Vendors; Big Data and Stream Analytics; and Applications of Stream Analytics.

Unit 7: Business Analytics (BA) – Emerging trends and Future Impacts: [7 Hrs]

Location-Based Analytics for Organizations; Analytics Applications for Consumers; Recommendation Engines; Web 2.0 Revolution and Online Social Networking; Cloud Computing and BI; Impacts of Analytics in Organizations –An Overview; Issues of Legality, Privacy and Ethics; and an overview of Analytics Ecosystem

Reference Books:

1. Ramesh Sharda, DursunDelen, Efraim Turban, et al, “Business Intelligence: A Managerial Perspective on Analytics”, 3rd Ed, Pearson India EducationInc, Indian Subcontinent Reprint 2018 (ISBN 978-93-528-6271-9)
2. Jiawei Han and Michelinekambe, Jian Pei, “Data Mining: Concepts and Techniques “, 3rded. The Morgan Kaufmann Publishers.
3. Michael Steinbach, Pang-Ning Tan, and Vipin Kumar, “Introduction To Data Mining”, Pearson International Edition, 2006.
4. James Allen,” Natural Language Understanding”, 2nd Ed., The Benjamin/Cummings Publishing Company Inc.
5. Daniel Jurafsky, James. H. Martin, “ Speech and Language Processing” , 2nd Edition, Pearson Education Inc.
6. Gabe Ignatow, Rada F. Mihalcea, “An Introduction to Text Mining: Research
7. Design, Data Collection, and Analysis”, 1st Edition,
8. ChengXiangZhai, Sean Massung, “Text Data Management and Analysis: A Practical Introduction to Information Retrieval and Text Mining” 1st Edition, ACM Book Series.
9. David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise
10. Integration with Tools, Techniques, NoSQL, and Graph”, 1st Edition, The MorganKaufmann Publishers.

Deep Learning
BIT423CO

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

Course Objectives:

The objective of this course is to cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks. The course also requires students to implement, train and debug their own neural network to solve some real world problem.

Course Contents:

Unit 1: Basics of artificial neural networks (ANN) [4 Hrs]
Artificial neurons, Computational models of neurons, Structure of neural networks, Functional units of ANN for pattern recognition tasks

Unit 2: Feed forward neural networks [5 Hrs]
Pattern classification using perceptron, Multilayer feedforward neural networks (MLFFNNs), Backpropagation learning, Empirical risk minimization

Unit 3: Deep neural networks (DNNs) [8 Hrs]
Difficulty of training DNNs, Greedy layerwisetraining, Optimization for training DNNs, Newer optimization methods for neural networks (AdaGrad, RMSProp, Adam), Second order methods for training, Regularization methods (dropout, drop connect, batch normalization)

Unit 4: Convolution neural networks (CNNs) [8Hrs]
Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet, Training a CNNs: weights initialization, batch normalization, hyperparameter optimization, Understanding and visualizing CNNs

Unit 5: Recurrent neural networks (RNNs) [7Hrs]
Sequence modeling using RNNs, Backpropagation through time, Long Short Term Memory (LSTM), Bidirectional LSTMs, Bidirectional RNNs, Gated RNN Architecture

Unit 6: Generative models [7Hrs]
Restrictive Boltzmann Machines (RBMs), Stacking RBMs, Belief nets, Learning sigmoid belief nets, Deep belief nets

Unit 7: Applications [6 Hrs]

Applications in vision, speech and natural language processing

Laboratory work:

There shall be following laboratory sessions.

1. Exercises on neural networks(NNs), solving a problem with NNs on tensor flow.
2. Exercises on CNNs, solving a problem with CNNs on tensor flow
3. Exercises on RNNs, solving a problem with RNNs on tensor flow

References Books:

1. Ian Goodfellow, YoshuaBengio and Aaron Courville, Deep learning, In preparation for MIT Press, Available online: <http://www.deeplearningbook.org>, 2016
2. S. Haykin, Neural Networks and Learning Machines , Prentice Hall of India, 2010
3. Satish Kumar, Neural Networks - A Class Room Approach, Second Edition, Tata McGraw-Hill, 2013
4. B. Yegnanarayana, Artificial Neural Networks, Prentice- Hall of India, 1999
5. C.M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

Digital Commerce
BIT428CO

Year: IV

Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal		Final		Total
3	1	2	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course Objectives:

The main objective of this course is to equip students with fundamental knowledge of electronic commerce, Mobile Commerce, Digital Marketing, web content management system, and uses of Artificial Intelligence required for analyzing and implementing Digital Commerce in a typical business set up.

Unit 1: E-Commerce

[11Hrs]

Introduction, Advantages and Disadvantages, Benefits, Features, Business models of E-Commerce, Infrastructure Requirement for E-Commerce, and Security for E-Commerce, Firewall, Cryptography, and Digital Token based Payments

Unit 2: Electronic Retailing

[2 Hrs]

Mercantile Models from the consumer's perspective, Distinctive phases of a consumer Mercantile Model, Prepurchase Preparation, Purchase consummation, Postpurchase Interaction

Unit 3: Introduction to Digital Commerce

[3 Hrs]

Need of digital commerce, comparison between Digital Commerce and E-Commerce, Challenges of Digital Commerce, Key Digital Commerce Trends

Unit 4: Fundamentals of Mobile Commerce

[8 Hrs]

Definition, Types of Mobile Commerce, Applications Comparison between M-Commerce and E-Commerce, Features of M-Commerce, Global System for Mobile Commerce(GSM), GPRS, 3G, 4G

Unit 5: Digital Marketing

[8 Hrs]

Internet Marketing and Digital Marketing Mix, Introduction to Search Engine Advertising, Introduction to SEO, Display marketing, Introduction to Social Media (Facebook, LinkedIn, Twitter, Youtube, Google, Instagram) Marketing

Unit 6: Web Content Management systems

[7 Hrs]

Planning and Developing Dynamic Web Content Sites, Building and Administrating a Wordpress Blog Site, Building an Online Social Network Using SocialGo

Unit 7: Application of Artificial Intelligence**[6 Hrs]**

Chatbots, Personalization, Intelligent Image Search

Laboratory work:

There shall be 11 lab classes on developing a digital commerce site using Wordpress.

Reference Books:

1. Electronics Commerce –Technologies and Applications: Bhaskar Bharat, TMH
2. Frontiers of Electronic Commerce: Kalakota ,Whinston, Pearson Education
3. E-Commerce : Strategy Technologies and Applications: Whiteley, David, TMH
4. Digital Marketing: Seema Gupta, Mc_Graw Hill

Multimedia and Application

BIT429CO

Year: I

Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal		Final		Total
3	1	2	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course Objectives:

The main objective is introduce the technologies, concept and techniques associated with the development of multimedia system.

Course Contents:

Unit 1: Multimedia System

[3Hrs]

- 1.1.Introduction, aspect, element, and structure
- 1.2.Medium, properties and notation
- 1.3.Data stream characteristics for traditional, and continuous media

Unit 2: Sound and Audio

[4 Hrs]

- 2.1 Basic sound concept, Computer representation and file formats
- 2.1.Basic music (MIDI) concepts, MIDI devices, messages, and software
- 2.2.Basic speech concept, generation, analysis (recognition and understanding), and Transmission

Unit 3: Image and Graphics

[4 Hrs]

- 3.1 Basic concept: representation, image format, graphics format
- 3.2 Image processing fundamentals, Synthesis, analysis and Transmission

Unit 4: Video and Animation

[4 Hrs]

- 4.1 Basic video concepts: signal representation, format, and transmission
- 4.2 Basic animation concept, languages, control and transmission

Unit 5: Data compression

[6Hrs]

- 5.1 Basic concepts, Coding requirement
- 5.2 Categories (Source, Entropy, and Hybrid Coding)
- 5.3 Basic compression techniques (Run-Length coding, Hoffman coding, Prediction coding, and Adaptive compression techniques)
- 5.4 Coding standard JPEG, H.261 (px64), MPEG and DVI

Unit 6: Optical Storage Media

[4 Hrs]

- 6.1 Basic technology
- 6.2 Video disk fundamentals, Blue ray disk
- 6.3 CD audio, CD ROM and Extended Architecture
- 6.4 Principles of CD Write-Once and CD Magneto Optical.

Unit 7: Multimedia Operating System

[4 Hrs]

7.1 Introduction, Real Time

7.2 Resource management: Requirement, Allocation scheme, Continuous media resource model.

7.3 Process management: Real-time processing requirement, Real-time scheduling, Earliest deadline first algorithm, Rate monotonic algorithm/

7.4 System Architecture.

Unit 8: Multimedia communication system

[4 Hrs]

8.1 Introduction to Multimedia communication

8.2 Application subsystem

8.3 Transport subsystem

8.4 Quality of service and resource management

Unit 9: Documentation Hypertext and MHEG

[4 Hrs]

9.1 Documents: architecture and Manipulation of multimedia data

9.2 Hypertext, hypermedia and multimedia

9.3 Hypermedia Systems: Architecture, nodes and pointers

9.4 Document Architecture: SGML, ODA and MHEG.

Unit 10: Synchronization

[4 Hrs]

10.1 Introduction

10.2 Notion of synchronization

10.3 Presentation requirements

10.4 Reference model for multimedia synchronization

10.5 Synchronization specification

10.6

Unit 11: Abstraction of programming

[2 Hrs]

11.1 Introduction

11.2 Abstraction levels

11.3 Libraries, system software, Toolkits Higher programming language, Object-oriented approaches

Unit 12: Multimedia Application

[2 Hrs]

12.1 Video-On demand

12.2 Video Conferencing

12.3 Educational Application, Industrial Application

12.4 Information System, Multimedia archives & digital libraries, Media entertainment, Media editors, trends

Laboratory work:

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

Note: Lab on any two topics.

Reference Books:

1. Ralf Steinmet and Klara Nahrstedt, 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. Tschritzis, D.C. Multimedia Programming objects, Environment and frameworks Addison-wesley-1995
4. Koegel-Buford J.F. Multimedia System Addison-Wesley, 1994
5. J.Jeffcoate, Multimedia in Practise: Technology &Application, PHI

GIS
BIT435CO

Year: IV Semester:I

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

Course Objectives:

The main objective of this course is to familiarize students with the fundamentals knowhow of geographical information system and its applications.

Course Contents:

- 1. Basic Concepts:** Definition and Components of GIS; Functionality of GIS; Areas of GIS application; Advantages and Limitations of GIS. **4Hrs**
- 2. GIS Data & Database:** Spatial and Attribute Data; Spatial Data Handling; Data Representations - points, lines, polygon; Information Organization and Data Structures - Raster and Vector data structures, Tessellations; File organization and formats; Geo-database; GIS Softwares. **8Hrs**
- 3. GIS Data Input:** Nature and Source of data; Method of spatial data capture - Primary and Secondary; Digitization and Scanning method, Techniques and procedure for digitizing, Errors of Digitization; Attribute data capture; GPS and Remote Sensing. **6Hrs**
- 4. GIS Mapping:** Defining Map, Categories of Maps, Map Contents and Map Scales; Georeferencing; Projection Systems – Types and Aspects; UTM. **8Hrs**
- 5. Data Editing in GIS:** Detecting and Correcting Errors; Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting; Conversion from other Digital Sources. **4Hrs**
- 6. Spatial Analysis:** Types of Spatial Analysis, Measurement in GIS, Query by Attributes, Spatial Queries, Attribute-based operation, Neighborhood Analysis, Connectivity Analysis, Overlay and Coverage Rebuilding. **7Hrs**
- 7. Data Sharing and Spatial Data Infrastructure:** Concept of Geospatial Infrastructure; Components of SDI - Standards, Metadata, Data Sharing Clearinghouse; NSDI. **6Hrs**
- 8. GIS in Nepal:** Present Situation; Major GIS activities; Prospects and Challenges of Implementation. **2 Hrs**

Laboratory Work:

There shall be lab exercises covering several topics of GIS.

Reference Books:

1. P. A. Burroughs & R. A. McDonnell, "*Principles of Geographical Information Systems*", Oxford University Press.
2. J. Star & J. Estes, "*Geographic Information Systems: An Introduction*", Prentice Hall, Englewood Cliffs, N. J.
3. Kang-Tsung, "*An Introduction to Geographic Information Systems*", Tata Mc Graw Hill.
4. C.P. Lo & Albert K.W. Yeung, "*Concepts & Techniques of Geographic Information Systems*", PHI Pvt. Ltd., New Delhi.
5. Ian Heywood, Sarah Cornelius, Steve Carver & Srinivasa Raju, "*An Introduction to Geographic Information Systems*", Pearson Education.
6. Basudeb Bhatta, "*Remote Sensing and GIS*".
7. J. Lee, D.W.S. Wong, "*Statistical Analysis with ArcView GIS*", John Wiley and Sons, Inc., New York.

Remote Sensing BIT436CO

Year: IV Semester: I

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

Course Objective:

The main objective of this course is to familiarize students with the fundamentals knowhow of remote sensing and its applications.

Course Contents:

- 1. Concept and Scope of Remote Sensing:** Definitions, Process and Characteristics of Remote Sensing System; Types and Components of Remote Sensing; Advantages and Limitations. **8 Hrs**
- 2. Concept of Electromagnetic Radiation (EMR):** Wavelength-frequency-energy relationship of EMR; EMR Spectrum and its properties; EMR wavelength regions and their applications; Atmospheric windows; Interactions of EMR with matter, Energy Interaction in the atmosphere, Energy Interactions with Earth Surface features; Spectral Signatures. **8Hrs**
- 3. Types and Characteristics of Sensor:** Sensor materials; Sensor System - Framing and Scanning System (Whiskbroom scanner, Push-broom scanner, Side Looking scanner); Imaging and non-imaging sensors; Active and passive sensors; Resolution of Sensors - Spectral, Spatial, Radiometric and Temporal; Scale, Mapping unit, Multi-band concepts and False Color Composites. **10 Hrs**
- 4. Remote Sensor Platforms and Satellite Orbits:** Ground, Airborne and Space-borne Platforms; Orbital Characteristics – Coverage, Passes, Pointing Accuracy; Geostationary, Sun synchronous, shuttle orbit, Semisynchronous orbit (Molniya orbit) and Quasi-zenith satellite orbit. **8 Hrs**
- 5. Space Imaging Satellites:** Early history of space imaging; Multispectral and Hyperspectral sensors, Radar, Lidar; Specification of some popular satellites – IRS, LANDSAT and SPOT series; High resolution satellites – IKONOS, Cartosat, Quickbird, OrbView, WorldView; Other latest earth resource satellites. **7 Hrs**
- 6. Integration of GIS and Remote Sensing** **2 Hrs**
- 7. Applications of Remote Sensing** **2 Hrs**

Laboratory Work:

There shall be lab exercises covering several topics of Remote Sensing and its integration with GIS.

References Books:

1. George Joseph, "*Fundamentals of Remote Sensing*".
2. Ravi P. Gupta, "*Remote Sensing Geology*".
3. Basudeb Bhatta, "*Remote Sensing and GIS*".

4. Noam Levin, "*Fundamental of Remote Sensing*".
5. Floid F. Savins, "*Remote Sensing, Principal and Interpretation*".
6. J. Lee, D. W. S. Wong, "*Statistical Analysis with ArcView GIS*", John Wiley and Sons, Inc., New York.

**Data Center and Disaster Recovery Centers
BIT437CO**

Year:IV

Semester:I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	1	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course Objective:

The main objective of the course is to provide students with the concepts of Data Center and Disaster Recovery Centers so that they can demonstrate the ability, knowledge and skills to be competent managers in the field of rapidly changing disaster management environment and be able to apply these in practical contexts.

Course Contents:

Unit 1: Introduction to Data Centre

[5 Hrs]

- Defining a data centre
- Identify the main data centre types
- Identify the business service options
- Emerging delivery and future demands

Unit 2: The Role and Objectives of a Data Centre

[7 Hrs]

- Driving factors for a data centre
- Data centre standards
- Data centre availability models and considerations
- Location and building considerations
- Analyzing reliability in the data center
- Data Center efficiency
- Data Center system planning

Unit 3: Design Overview

[10 Hrs]

- Criticality and availability considerations
- Fire Protection Methods in the Data Center
- Cabling Strategies for Data Centers
- Maintaining humidity, optimizing cooling layouts
- Physical Security
- Power Management: power Generators, Power redundancy, power distribution
- Physical Infrastructure: Infrastructure Management and Designs, rack fundamentals, choosing between room, rack and row based cooling for data centers

- The four key constraints (4C's) – Power, Cooling, IT Infrastructure and Space

Unit 4: Managing the Data Centre [6Hrs]

- Regulations, best practices and operational processes
- Move, adds and change processes
- Efficient energy management
- Decommissioning processes
- Logical, IT & physical security

Unit 5: The Data Centre Industry and Market [5Hrs]

- The size of the market
- Market drivers and trends
- Powering the internet
- Case Study
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Unit 6: Cloud Data Center [4 Hrs]

Unit 7: Disaster Recovery Center [8Hrs]

- Disaster Recovery Plan
- Business continuity and Disaster Recovery
- Data Backup
- Cloud Disaster Recovery
- Disaster Recovery Site
-

Notes: Students need to formulate planning document of DR center to secure 20 marks in practical.

Reference Books:

1. Scott D. Lowe, James Green and David Davis, Building a Modern Data Center Principles and Strategies of Design, ActualTech Media, 2016, New York
2. Mauricio Arregoces and Maurizio Portolani, Data Center Fundamental, Cisco Press, 2004, USA
3. Samee Ullah Khan and Albert Y. Zomaya, Handbook on Data Centers, Springer, 2015
4. Philip Jan Rothstein, IT Disaster Recovery Planning For Dummies, Wiley Publishing Inc, 2007