Advanced Java Programming

Course Title: Advanced Java Programming
Course No: BIT401
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60+ 20+20
Pass Marks: 24+8+8
Credit Hrs: 3

Course Description:
This course explores advanced Java language techniques. GUI and event-driven programming, database connectivity, socket programming, distributed programming, and servlets and JSP technology will all be highlighted.

Course Objectives:
To Demonstrate basic Java Programming, exemplify the concept of GUI programming and event handling, demonstrate Java database connectivity and socket programming. Furthermore, it discusses the applications of java in web programming using servlets and JSP Technology and introduces the concepts of distributed programming with java.

Course Contents:

Unit 1: Programming in Java (8 Hrs.)
Architecture and Features of Java, Environment variables: Path and Class path variables, Structure of Java Programs, Compiling and Running Java Programs; Arrays in Java, for each loop, Class and Object, Method Overloading, Access Specifies, Interface, Inner Class, Final and Static Modifiers, Packages, Inheritance, Method Overriding; Exception Handling: Types of Exceptions, Try, Catch, Finally, Throws, and Throw keywords, Creating Exception Class; Concurrency: Introductions to Threads, Thread States, Writing Multithreaded Programs, Thread Properties, Thread Methods, Synchronizing Threads, Setting and Getting Thread Priorities; Working with Files: Byte Stream Classes, Character Stream Classes, Random Access Files, Reading and Writing Objects

Unit 2: User Interface Components with Swing (10 Hrs.)
Introduction: Concept of AWT, AWT vs. Swing, Swing Class Hierarchy, Component vs. Containers; Layout Managers: No Layout, Flow layout, Border Layout, Grid Layout, Gridbag Layout, Group Layout; GUI Controls: JTextField, JPasswordField, JTextArea, JScrollPane, JLabels, JCheckBoxe, JRadioButton, Borders, JComboBoxe, JSliders; JFrame, JPanel, JOptionPane Dialog Boxes, Creating Custom JDialogBoxe, JFileChooser, JColorChooser, JInternalFrame; JMenu, JMenuItem, JIcons in JMenuItem, JCheckBox and JRadioButtons in Menu Items, Pop-up Menus, Keyboard Mnemonics and Accelerators, Enabling and Disabling JMenuItems, JToolBars, Tooltip Text

Unit 3: Event Handling (4 Hrs.)
Event Handling Concept, Event Delegation Model, Listener Interfaces, Using Action Commands, Adapter Classes; Handling ActionEvents, KeyEvents, FocusEvents, MouseEvents, WindowEvents, ItemEvents

Unit 4: GUI with JavaFX (3 Hrs.)
Introduction, JavaFX vs Swing, Steps of Wring JavaFX Programs, Writing JavaFX programs; JavaFX Layouts: FlowPane, BorderPane, Hbox, VBox, GridPane; JavaFX UI Controls: Label, TextField, Button, RadioButton, CheckBox, Hyperlink, Menu, Tooltips, FileChooser

Unit 5: Java Database Connectivity (4 Hrs.)
Architecture of JDBC, JDBC Driver Types, Steps of JDBC, Statements, Result Sets, DMS Operations Using Java; Prepared Statements, Multiple Results, Scrollable Result Sets, Updateable Result Sets, Row Sets and Cached Row Sets, Transactions

Unit 6: Network Programming (5 Hrs.)
Review of Transmission control Protocol (TCP), User Datagram Protocol (UDP), TCP vs UDP, Ports, IP Address Network Classes in JDK; Steps of Writing Socket programs using TCP, Steps of Writing Socket programs using UDP, Examples of Socket programs using TCP and UDP, Working with URL's, Working with URL Connection Class

Unit 7: Servlets and Java Server pages (8 Hrs.)
Introduction to Servlets, Servlet Lifecycle, The servlet APIs, Methods of Writing Servlet Programs, Reading Form Parameters, Form Processing, Handling GET/POST Response , Servlets and JDBC; JSP Access Model, Servlet vs. JSP; JSP Syntax (Directions, Declarations, Expression, Scriplets, Comments), JSP Implicit Objects, Object Scopes, Form Processing, Database Access with JSP

Unit 8: RMI and CORBA (3 Hrs.)
Introduction of RMI, RMI, Architecture, Steps of Writing RMI Programs, Creating and Executing RMI Applications; Introduction to CORBA, RMI vs CORBA, Architecture of CORBA, Concept of IDL, Sample Examples of IDL

Laboratory Works:
Students need to write programs related to basic java programming concepts, Designing GUI, Event Handling, JDBC, Network Programming, Web Programming, and Distributed Programming.

References:

1. Cay S. Horstmann, Core Java Volume I--Fundamentals, Pearson, Eleventh Edition, 2018
2. Cay S. Horstmann, Core Java Volume II-Advance Features, Pearson, Eleventh Edition, 2019
3. Herbert Schildt, Java: The Complete Reference, McGraw-Hill Education, Eleventh Edition, 2018
4. D.T. Editorial Services, Java 8 Programming Black Book, Dreamtech Press, 2015

Software Project Management

Course Title: Software Project Management
Course No: BIT402
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60+20+20
Pass Marks: 24+8+8
Credit Hrs: 3

Course Description:
This course introduces the concepts of project management concepts. It also emphasizes on evaluation, estimation, planning, risk management, managing people, managing contract and quality, activity planning, resource allocation.

Course Objectives:
To familiarize the students in choosing the best alternatives in managing projects with respect to risk and to provide them knowledge about different project management tools and techniques.

Course Contents:

Unit 1: Introduction to Software Project Management (3 Hrs.)
Introduction; What is a Project; Software Projects versus Other Types of Project; Importance of Project Management, Activities Covered by Software Project Management; Plans, Methods and Methodologies; What is Management; Management Control; Traditional versus Modern Project Management Practices

Unit 2: Project Evaluation and Program Management (5 Hrs.)
Introduction; Project Portfolio Management; Evaluation of Individual Projects; Cost–benefit Evaluation Techniques; Risk Evaluation; Program Management; Managing the Allocation of Resources within Program; Strategic Program Management, Creating a Program, Aids to Program Management, Some Reservations about Program Management

Unit 3: An Overview of Project Planning (2 Hrs.)
Introduction to Step Wise Project Planning; overview of different steps from step 0 to step 10.

Unit 4: Selection of an Appropriate Project Approach (5 Hrs.)
Introduction, Build or Buy?, Choosing Methodologies and Technologies, Software Processes and Process Models, Choice of Process Models, Structure versus Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping, Other Ways of Categorizing Prototypes, Incremental Delivery, Atern/Dynamic Systems Development Method, Rapid Application Development, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selecting the Most Appropriate Process Model

Unit 5: Software Effort Estimation (5 Hrs.)
Introduction; Where are Estimates Done; Problems with Over- and Under-Estimates; the Basis for Software Estimating; Software Effort Estimation Techniques; Bottom-up Estimating; The Top-down Approach and Parametric Models; Expert Judgment; Estimating by Analogy; Function

Points Mark II; COSMIC Full Function Points; COCOMO II: A Parametric Productivity Model; Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Caper Jones Estimating Rules of Thumb

Unit 6: Activity Planning (5 Hrs.)
Introduction; Planning Objectives and timing; Project Schedules; Projects and Activities; Sequencing and Scheduling Activities; Network Planning Models; Formulating a Network Model; Adding the Time Dimension; The Forward Pass; The Backward Pass; Identifying the Critical Path; Activity Float; Shortening the Project Duration; Identifying Critical Activities; Activity-on-Arrow Networks

Unit 7: Risk Management and Resource Allocation (6 Hrs.)
Introduction; Categories of Risk; A Framework for Dealing with Risk; Risk Identification; Risk Assessment; Risk Planning; Risk Management; Evaluating Risks to the Schedule; Applying the PERT Technique; Nature of Resources, Identifying and Scheduling Resources; Creating Critical Paths, Counting the Cost, Publishing the Resource Schedule

Unit 8: Monitoring and Control (4 Hrs.)
Introduction; Creating the Framework; Collecting the Data; Visualizing Progress; Earned Value Analysis ; Change Control; Software Configuration Management

Unit 9: Managing Contracts (3 Hrs.)
Introduction; Types of Contract; Stages in Contract Placement; Typical Terms of a Contract; Contract Management, Acceptance

Unit 10: Managing People in Software Environments and working in teams (4 Hrs.)
Introduction; Selecting the Right Person for the Job, Motivation, Stress Management, Health and Safety, Some Ethical and Professional Concerns; Organization and Team Structures; Coordination Dependencies; Dispersed and Virtual Teams; Communication Genres; Communication Plans; Leadership

Unit 11: Software Quality and Project Closeout (3 Hrs.)
Introduction; Importance of Software Quality; Defining Software Quality, ISO 9126, Techniques to Enhance Software Quality; Project Closure Process, Project Closeout Report

Laboratory Works:
The laboratory works should focus on different CASE tools regarding project management, Scheduling, estimation, software configuration management, risk management. The students should prepare a report on a case study focusing on cost benefit analysis, earned value analysis, risk analysis

References:

1. Software Project Management 6th edition; Tata McGraw Hill Education Private Limited; Bob Hughes, Mike Cotterell, Rajib Mall
2. Introduction to Software Project Management & Quality Assurance, Darrel Ince, I. Sharp, M. Woodman, Tata McGraw Hill

3. Software Project Management: A Unified Framework, Walker Royce, Addison-Wesley, An Imprint of Pearson Education

E-Commerce

Course Title: E-Commerce
Course No: BIT403
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Credit Hrs: 3

Course Description:
This course covers the fundamental concepts of E-commerce and E-business models, E-commerce security, e-commerce payment systems, e-commerce catalogs, e-commerce marketing and search engine optimization.

Course Objectives:
The main objective of this course is to provide basic concepts of E-commerce and its components, process of developing and implementing E-commerce systems.

Course Contents:

Unit 1: Introduction (4 Hrs.)
E-commerce, E-business, Trends in E-commerce, Unique Features of E-commerce, Types of E-commerce: B2C, B2B, C2B, C2C, Mobile E-Commerce, Social E-commerce, Local E-commerce, Pure vs. Partial E-commerce; History of E-commerce: Invention, Consolidation, Reinvention; Understanding E-commerce: Technology, Business, and Society Perspectives; Challenges in E-commerce, Status of E-commerce in Nepal

Unit 2: E-commerce Business Models (8 Hrs.)
Business Model, Key Elements of Business Model, Raising Capital for Business Model: Seed Capital, Elevator Pitch, Incubators, Angel Investors, Venture Capital Investors, Crowdfunding; B2C Business Models: E-tailer, Community Provider, Content Provider, Portal, Transaction Broker, Market Creator, Service Provider; B2B Business Models: Net Market Places (E-distributer, E-procurement, Exchanges, Industry Consortia), Private Industrial Networks; Electronic Data Interchange (EDI), EDI Layered Architecture, EDI in E-commerce, E-commerce and Industry Value Chain, Firm Value Chain, Firm Value Web, Case Studies of Global and Local E-commerce Systems;
Case Study of Global and Local E-commerce Service Providers

Unit 3: E-Commerce Security (8 Hrs.)
E-commerce Security, E-commerce Security Environment, Dimensions of E-commerce Security: Integrity, Nonrepudiation, Authenticity, Confidentiality, Privacy, Availability; Security Threats in E-commerce: Malicious Code, Potentially Unwanted Programs, Phishing, Hacking, Cyber vandalism and Hacktivism, Data Breaches, Credit Card Fraud, Identity Fraud, Spoofing, Pharming, and Spam, Sniffing and Man-in-The-Middle Attacks, DOS and DDOS Attacks, Insider Attacks, Social Network Security Issues, Mobile Platform Security Issues, Cloud Security Issues, IOT Security Issues; Achieving E-commerce Security: Cryptography, Digital Envelopes, Digital Certificates and Public Key Infrastructure, SSL, TLS, HTTPS, VPNs, Firewalls, Intrusion Detection and Prevention, Antiviruses; E-commerce Security Plan, Laws, Government and Public Policies, Electronic Transaction Act of Nepal

Unit 4: E-commerce Payment Systems (8 Hrs.)
E-payment System, Online Credit Card Transactions, Online Stored Value Payment System, Mobile Payment Systems, Blockchain and Cryptocurrencies, Electronic Billing Presentment and Payment: Biller Direct, Online Banking, Consolidator, Mobile; Auctioning in E-commerce (English, Dutch, Vickery, Double), SET Protocol, Features of SET, Participants in SET, Card Holder Registration, Merchant Registration, Purchase Request, Dual Signature, Payment Authorization, Payment Capture; Status of E-Payment Systems in Nepal, Case Studies of Global and Local Payment Systems

Unit 5: Building E-commerce System (5 Hrs.)
E-commerce Website/Software, Building Catalogs: Static, Dynamic, Building Shopping Cart, Transaction Processing, Development of E-commerce Website/Software: Databases, Application Programs, Integration with ERP Systems, Integration with Payment Gateways, Using Open Source CMS for Development of E-commerce Applications, Hosting E-commerce Website

Unit 6: E-Commerce Marketing and Advertising (7 Hrs.)
Internet Audience and Consumer Behavior, Consumer Behavior Models, Online Purchase Decision; Online Advertisement, Ad Targeting, Search Engine Marketing and Advertising, Display Ad Marketing, E-mail Marketing, Affiliate Marketing, Viral Marketing, Lead Generation Marketing, Social, Mobile and Local Marketing, Multi-Channel Marketing; Costs and Benefits of Online Marketing: Online Marketing Metrics Lexicon, Costs of Online Advertising, Pricing Models for Online Advertisements; Social Marketing Process, Facebook Marketing: Features and Tools; Twitter Marketing: Features and Tools;Pinterest Marketing: Features and Tools; Location Based Marketing Tools

Unit 7: Optimizing E-commerce Systems (5 Hrs.)
Search Engine Optimization, Working mechanism of Search Engines, On Page SEO, Off Page SEO, Page Ranks, Using Google Analytics, Social Media Analytics, Recommendation Systems: Collaborative, Content Based, Use of Recommendation Systems in E-commerce

Laboratory Works:
The laboratory work includes developing E-commerce websites. The students are highly encouraged to use server side and client side scripting for developing the websites with functions including product list, product search, product category, shopping cart, order history, wish list, checkout, and payment. Students can also use open source ecommerce CMS frameworks and configure them to simulate e-commerce systems. Additionally, the laboratory work includes using SEO tools like Google Analytics, Facebook Analytics, and Twitter Analytics.

References:

1. Kenneth C. Laudon and Carol GuercioTraver, E-commerce Business Technology Society, Pearson, 17th Edition, 2022
2. Electronic Transaction ACT of Nepal
3. SET Secure Electronic Transaction Specification Book 1: Business Description
4. Efraim Turban, Jon Outland, David King, Jae Kyu Lee, Ting-Peng Liang, Deborrah C. Turban, Electronic Commerce A Managerial and Social Networks Perspective, Springer
5. Gary P. Schneider, Electronic Commerce, Course Technology, Cengage Learning

6. Colin Combe, Introduction to E-business Management and strategy, Elsevier
7. Dave Chaffey, E-Business & E-Commerce Management Strategy, Implementation And Practice, Pearson
8. Cristian Darie and EmilianBalanescu, Beginning PHP and MySQL E-Commerce From Novice to Professional, Apress
9. Cristian Darie and Karli Watson, Beginning ASP.NET E-Commerce in C# From Novice to Professional, Apress
10. Larry Ullaman, Effortless E-commerce with PHP and MySQL, New Riders
11. Eric Enge, Stephan Spencer, Rand Fishkin, and Jessie C. Stricchiola foreword by John Battelle, The Art of SEO: Mastering Search Engine Optimization, O"Reilly
12. Adam Clarke, SEO Learn Search Engine Optimization With Smart Internet Marketing Strategies: Learn SEO with smart internet marketing strategies
13. Charu C. Aggrawal, Recommender Systems, Springer

Project work

Course Title: Project work
Course No: BIT404
Nature of the Course: Lab
Semester: VII

Full Marks: 80 + 20
Pass Marks: 32+ 8
Credit Hrs: 3

Course Description:
This course covers theoretical and practical concepts needed to develop a real world software system. The course focuses on enabling students with the skills related to software development. The course includes practicing the abilities pertaining to the planning, analysis, design, and implementation and testing of software applications.

Course Objectives:
The objective of this course is to develop theoretical and practical skills needed to develop real world software applications using different software development tools and techniques.

Course Details:

Nature of Project:
The project work should include development of an application/system software. Students are highly recommended to implement relevant algorithms, theories and concepts that they have learned. The project should be practiced by following analysis, design, implementation and testing phases. The project can be done in group with at most **three members** in each group. For the implementation of the project, students can choose appropriate language technologies as per comfort and skills. While implementing the project, students should be able to write their own program modules rather than relying on predefined APIs or Plugins except in some unavoidable circumstances.

Phases of Project:
The following are the phases of project work:

1. **Proposal Submission and Presentation:** Students must submit and present project proposal on 3rd to 4th week of start of the seventh semester.

2. **Mid-Term:** Students must submit progress report and defend midterm progress of their project work on the 10th to 11th week of the seventh semester.

3. **Final Submission:** Students must submit and defend the project work during last week of the seventh semester but before final board examination. The final defense will include a viva voice followed by a demonstration of the project. The final defense will be conducted by an evaluation committee with an external from the university. Students must have to submit the project final report to their respective department of college/campus before at least 10 days of final defense date. The report should be submitted in standard format as prescribed. The hard/soft copy of report should be made available to the external before a week of presentation date.

Provision of Supervision:
The supervisor should be a regular faculty of the campus/college. The role of supervisor is to provide appropriate guidance to the students throughout the project. A supervisor can supervise at most **three groups** of the project in a section. The supervisor should rigorously supervise, monitor, feedback and evaluate the project groups under his/her supervision.

Evaluation Scheme:

1. **Proposal Defense -** 10% Marks of 100 (2 Marks Head/Program Coordinator + 6 Marks Supervisor + 2 Marks Internal Examiner)
2. **Midterm -** 20% Marks of 100 (3 Marks Head/Program Coordinator + 14 Marks Supervisor + 3 Marks Internal Examiner)
3. **Final Defense -** 70% Marks of 100 (5 Marks Head/Program Coordinator + 40 Marks Supervisor + 5 Marks Internal Examiner + 20 Marks External Examiner)

The evaluation committee and evaluation criteria should be as follow;

a. Evaluation committee
- HOD/Coordinator of the campus/college
- Project Supervisor (Regular faculty of the campus/college)
- Internal Examiner (Regular faculty of the campus/college)
- External Examiner (Allocated from university at the final defense)

b. Marks Allocation:
- Head / Program Coordinator – 10
- Project Supervisor – 60
- Internal Examiner – 10
- External Examiner – 20

Total – 100 (Out of which 80 is considered as internal marks and 20 marks is considered as final external marks. Student have to pass in both separately scoring 32 and 8 marks respectively)

c. Focus of the evaluation
- Presentation Skills
- Level of Work and Understanding(Level of Analysis, Design, Implementation, Testing, Result Analysis done for the project)
- Project Report
- Viva/Question Answer
- Demonstration of the project
- Teamwork and Contribution

Roles and Responsibilities:
- **HOD/Coordinator:** The role of HOD/Coordinator is to coordinate with supervisor, internal examiner, external examiner and students. The HOD/Coordinator should monitor the students' project progress in coordination with the respective supervisors. The HOD/Coordinator is responsible for arranging the proposal defense, midterm and final

defense. The HOD/Coordinator should participate and evaluate proposal defense, midterm, and final defense.

- **Project Supervisor:** The role of project supervisor is to supervise students' project throughout the semester. The supervisor should rigorously feedback and guide the students. The supervisor should monitor the progress of projects under supervision. Supervisor should participate and evaluate proposal defense, midterm and final defense.

- **Internal Examiner:** The role of internal examiner is to evaluate the students' project during different evaluation phases of the project. The internal examiner should participate and evaluate proposal defense, midterm, and final defense.

- **External Examiner:** The role of external examiner is to evaluate the students' project during final defense evaluation. The examiner should participate and evaluate viva voce, presentation and demonstration session during the final defense.

- **Student:** The role and responsibilities of student include development of the project, project report preparation, and defending the project work throughout each evaluation phases. Despite of project work being group work, each student should have equal role and responsibilities in the project. Each student will be evaluated individually so student should be able to demonstrate his/her contribution in the project work individually. Students should maintain a log visits with their supervisors at different dates during their work. The log should include technical feedbacks from their supervisors.

Report Contents:

1. **Prescribed content flow for the project proposal**

    1. Introduction
    2. Problem Statement
    3. Objectives
    4. Methodology
        a. Requirement Identification
            i. Study of Existing System / Literature Review
            ii. Requirement Analysis
        b. Feasibility Study
            i. Technical
            ii. Operational
            iii. Economic
            iv. Schedule (Gantt chart showing the project timeline)
        c. High Level Design of System (Methodology of the proposed system/ Flow Charts/ Working Mechanism of Proposed System / Description of Algorithms)
    5. Expected Outcome
    6. References

2. Prescribed content flow for the project report

1. Cover & Title Page
2. Certificate Page
   i. Supervisor Recommendation
   ii. Head / Program Coordinator, Supervisor, Internal and External Examiners' Approval Letter
3. Acknowledgement
4. Abstract Page
5. Table of Contents
6. List of Abbreviations, List of Figures, List of Tables
7. Main Report
8. References
9. Bibliography (if any)
10. Appendices (Screenshots + Snippets of major source code components + Log of visits to supervisor)

3. Prescribed chapters in the main report

Chapter 1: Introduction

1.1. Introduction
1.2. Problem Statement
1.3. Objectives
1.4. Scope and Limitation
1.5. Development Methodology
1.6. Report Organization

2. Chapter 2: Background Study and Literature Review

2.1. Background Study (Description of fundamental theories, general concepts and terminologies related to the project)
2.2. Literature Review (Review of the similar/relevant projects, theories and results by other researchers)

3. Chapter 3: System Analysis

3.1. System Analysis
   3.1.1. Requirement Analysis
      i. Functional Requirements (Illustrated using use case diagram/use case descriptions)
      ii. Non Functional Requirements
   3.1.2. Feasibility Analysis
      i. Technical
      ii. Operational
      iii. Economic
      iv. Schedule

   3.1.3. Analysis (May be Structured or Object Oriented)

If structured approach:

- Data modelling using ER Diagrams
- Process modelling using DFD

If object oriented approach:

- Object modelling using Class and Object Diagrams,
- Dynamic modelling using State and Sequence Diagrams
- Process modelling using Activity Diagrams

4. **Chapter 4: System Design**
   4.1. Design (May be Structured or Object Oriented as per the approach followed in analysis chapter)

If structured approach:

- Database Design: Transformation of ER to relations and normalizations
- Forms and Report Design
- Interface and Dialogue Design

If object oriented approach:

- Refinement of Class, Object, State, Sequence and Activity diagrams
- Component Diagrams
- Deployment Diagrams

   4.2. Algorithm Details

5. **Chapter 5: Implementation and Testing**
   5.1. Implementation
      5.1.1. Tools Used (CASE tools, Programming languages, Database platforms)
      5.1.2. Implementation Details of Modules (Description of classes/procedures/functions/methods/algorithms)
   5.2. Testing
      5.2.1. Test Cases for Unit Testing
      5.2.2. Test Cases for System Testing
   5.3. Result Analysis

6. **Chapter 6: Conclusion and Future Recommendations**
   6.1. Conclusion
   6.2. Future Recommendations

References

While writing above chapters students should avoid basic definitions. They should relate and contextualize the above mentioned concepts with their project work.

Citation and Referencing:

The listing of references should be listed in the references section. The references contain the list of articles, books, urls, etc. that are cited in the document. The books, articles, and others that are studied during the study but are not cited in the document can be listed in the bibliography section. The citation and referencing standard should be IEEE referencing standard. The text inside the document should be cited in IEEE style. The IEEE referencing standard can be found in the web.

Report Format Standards:

A. Page Number

The pages from certificate page to the list of tables/figures/abbreviations/approvals should be numbered in roman starting from i. The pages from chapter 1 onwards should be numbered in numeric starting from 1. The page number should be inserted at bottom, aligned center.

B. Page Size and Margin

The paper size must be a page size corresponding to A4. The margins must be set as

- Top = 1 in (2.54 cm)
- Bottom = 1 in (2.54 cm)
- Left = 1.25 in (3.17 cm)
- Right = 1 in (2.54 cm)

C. Paragraph Style

- All paragraphs must be justified and have spacing of 1.5.

D. Text Font of Document

- The contents in the document should be in Times New Roman font
- The font size in the paragraphs of document should be 12

E. Section Headings

- Font size for the headings should be 16 for chapter headings, 14 for section headings, 12 for sub-section headings. All the headings should be bold faced.

F. Figures and Tables

- Position of figures and tables should be aligned center. The figure caption should be centred below the figure and table captions should be centred above the table. All the captions should be of bold face with 12 font size.

Final Report Binding and Submission:

No of Copies: 3 (College Library + Self + Dean Office)
Look and Feel: Golden Embracing with Black Binding
A final approved signed copy of the report should be submitted to the Dean Office, Exam Section, Institute of Science and Technology, Tribhuvan University

Text Book: None

DSS and Expert System

Course Title: DSS and Expert System
Course No: BIT405
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60+ 20+20
Pass Marks: 24+8+8
Credit Hrs: 3

Course Description:
This course is a study uses of artificial intelligence in business decision making. Emphasis will be given in business decision making process, design and development of decision support systems and expert systems.

Course Objectives:
To introduce intelligent business decision making, to describe design, development and evaluation of DSS Systems, to know various models of building DSS systems and to explain concept behind expert systems

Course Contents:

Unit 1: Introduction to management Support Systems and Decision making (14 Hrs.)
Managers and decision making: Bounded rationality, muddling through; Factors in decision making: memory, bias, intuition, experience, models, analytics; Qualitative vs. quantitative decision making; Managerial decision making and information systems; Computerized decision support and supporting technologies; Group decision making, groupware Supporting Business Decision Making: Introduction, History, Conceptual Perspective, Decision Support vs. Transaction Processing System, Categories of DSS Applications and Products, DSS Framework, Building Decision Support Systems; Gaining Competitive Advantage with Decision Support Systems: Introduction, Technology Trends, Gaining Competitive Advantage, Examples of Strategic DSS, Opportunities and IS Planning, DSS Benefits, Limitations, and Risks, Resistances to Using DSS

Unit 2: The Make-up of a Decision Support System (15 Hrs.)
Types and roles of DSS. Data component: data vs. information, quality of information, databases and database management systems, data warehouses; Model component: representation, linearity of the relationship, deterministic vs. Stochastic, descriptive vs. Normative, causality vs. Correlation, methodology dimension, data mining and intelligent agents; Knowledge Engine Component; User Interface: Action language, display or presentation language, interface issues; User, Designing and Evaluating DSS Systems: Introduction, Design and Development Issues, Decision Oriented Diagnosis, Prepare a Feasibility Study, Choose a Development Approach,DSS Project Management and Participants; Designing and Evaluating DSS User Interfaces: Introduction, Overview of User Interface, User Interface Styles, ROMC Design Approach, Building DSS User Interface, Comments onDesign Elements, Guidelines of Dialog and UI Design, Factors of UI Design Success

Unit 3: Modeling Decisions (6 Hrs.)
Introduction to Decision Analysis; Elements of Decision Problems, uncertain events, consequences, Structuring Decisions, Making Choices, making decisions with multiple objectives, assessing trade-of weights, Sensitivity Analysis, value of Information and experts

Unit 4: Expert Systems (10 Hrs.)
Definition and Features of Expert Systems, Architecture and Components of Expert Systems, Persons Who Interact with Expert Systems, Advantages and Disadvantages of Expert Systems, Expert Systems Development Life Cycle, Error Sources on Expert System Development

Laboratory Works:
Student should study and develop decision support systems or expert systems as a mini-project.

References:

1. Daniel J. Power, Decision Support Systems: Concepts and Resources for Managers, IllustratedEdition, Praeger.
2. I. Gupta and G. Nagpal, Artificial Intelligence and Expert Systems, Mercury Learning & Information, 2020

Mobile Application Development

Course Title: Mobile Application Development
Course No: BIT406
Nature of the course: Theory + Lab
Semester: VII

Full Marks: 60+20+20
Pass Marks: 24 + 8 + 8
Credit Hrs: 3

Course Description:
This course introduces mobile application development frameworks, architectures, design and engineering issues, techniques, methodologies for mobile application development

Course Objectives:
The main objective of this course is to provide knowledge of understanding characterization and architecture with designing and developing of mobile applications.

Course Contents:

Unit 1: Overview of Mobile Application Development (5 Hrs.)
Introduction to Mobile Computing, Mobility landscape, Mobile computing functions, 3-tier architecture of mobile computing, Factors in developing mobile applications, Introduction to mobile application development frameworks (Swiftic, React Native, Xamarin, Ionic, Sencha, Adobe PhoneGap), Mobile ecosystem, Mobile application development environments

Unit 2: Architecture, Application Design Issues and Mobile Development Frameworks (12 Hrs.)
Mobile Development Life Cycle, Mobile computing architectures, Fully centralized and client server architectures, N-tier architecture, Elements of mobile design, Fully centralized framework, N-tier client server framework, Mobile operating system and Virtual machine, BREW (Binary Runtime Environment for Wireless), BREW SDK, Building and deploying BREW application, WAP Architecture, WAP proxies and gateways, Multimedia messaging services, Design patterns for mobile applications, Synchronization and replication of mobile data

Unit 3: User Interaction Design (12 Hrs.)
Generic UI development, Form factors and User input technology, Elements of the user interfaces (channels, interaction, prompts, response, commands, menus, forms, natural language), User interface components, Voice UI and Mobile apps, Text to Speech techniques, Designing the right UI

Unit 4: Testing and Publishing Apps (5 Hrs.)
Debugging mobile apps, Mobile application build and delivery, Testing mobile applications, White box testing, Black box testing, Automated versus Manual testing, Coding standards, App distribution through App stores

Unit 5: Mobile IP Network (2 Hrs.)
IP and mobile IP Network, Packet delivery, Mobile TCP

Unit 6: Wireless Connectivity and Mobile Applications (4 Hrs.)
Frequency Spectrum, GSM vs. CDMA, Comparison of 2G, 3G, 4G, Modulation and Transmission techniques, Short range and long range wireless communication, Security in wireless network, Bluetooth security, Security in long range wireless networking technologies, SMS

Unit 7: Location and Sensing (5 Hrs)
Access to hardware and sensors, Maps and location in mobile app, Mobility and location based service, Data acquisition of location information, GPS based solution, Non GPS solution, Location based service

Laboratory Works:
The laboratory should contain all the features mentioned in a course, which should include

- Language overview (Java, Object oriented concept)
- Basic Concept of Android application architecture
    - source, resource folder concept
- Concept of android Layouts
    - Concept of Linear layout, Relative layout, toolbar
    - Concepts of list view, recycler view, grid view, scroll view, view pager, tab Layout
- Menu
    - Option menu, context menu
- Database
    - SQLite overview
- API Implementation
    - Working with volley
    - Working with Retrofit
- Advanced
    - JSON Parsing
    - Google Play Service (Maps, GPS)
    - FCM (Firebase Cloud Messaging)

References:

1. Mobile Computing Principles : Designing and Developing Mobile Applications with UML and XML, Reza B'Far, Cambridge University Press, 2005
2. Mobile Design and Development, Brian Fling, O'Reilly, 2009
3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service Creation

Simulation and Modeling

Course Title: Simulation and Modeling
Course No: BIT407
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Credit Hrs: 3

Course Description:
This course focuses on introducing modeling and simulation of different types of systems, its validation, verification and analysis of simulation output. It also emphasizes on random number and queuing theory.

Course Objectives:
To make students understand the concept of simulation and modeling of real time systems.

Course Contents:

Unit 1: Introduction to Simulation (7 Hrs.)
System Concept, System Modeling, Mathematical Models: Nature and Assumptions, Verification, Validation, and Calibration of Model, Model Development Life Cycle, Advantages and Disadvantages of Simulation, Limitation of the Simulation Techniques, Areas of Applications, Monte Carlo Simulation method

Unit 2: Continuous Systems (8 Hrs.)
Continuous System Model, Differential Equation, Analog Method, Hybrid Computers, Digital-Analog Simulators, Continuous System Simulation Languages (CSSLs), CSMP III, Hybrid Simulation, Feedback Systems, Examples

Unit 3: Discrete System Simulation (9 Hrs.)
Discrete Events, Representation of Time, Generation of Arrival Patterns, Simulation of a Telephone System, Delay Calls, Simulation of Programming Tasks, Gathering Statistics, Counters and Summary Statistics, Measuring Utilization and Occupancy, Recording Distribution and Transit Times, Discrete Simulation Languages

Unit 4: Queuing System (6 Hrs.)
Characteristics and Structure of Basic Queuing System, Models of Queuing System, Queuing Notation, Single Server and Multiple Server Queuing Systems, Measurement of Queuing System Performance, Elementary Idea about Networks of Queuing with Particular Emphasis to Computer System, Applications of Queuing System

Unit 5: Verification and Validation (4 Hrs.)
Design of Simulation Models, Verification of Simulation Models, Calibration and Validation of the models, Three-Step Approach for Validation of Simulation Models, Accreditation of Models

Unit 6: Analysis of Simulation Output (4 Hrs.)
Confidence Intervals and Hypothesis Testing, Estimation Methods, Simulation Run Statistics, Replication of Runs, Elimination of Initial Bias

Unit 7: Simulation Languages (7 Hrs.)
Types of Simulation Languages, Discrete Systems Modeling and Simulation With GPSS, Resources in GPSS, GPSS Programs, Applications, Structural Data and Control Statements, Hybrid Simulation, Feedback Systems : Typical Applications, SIMSCRIPT Programs

Laboratory Works:
Practical should include the simulation of some real time systems (continuous and discrete event systems), Queuing Systems, study of Simulation Tools and Language

References:

1. Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicole, "Discrete Event system simulation", 5th Edition, Pearson Education
2. Geoffrey Gordon: System Simulation, Prentice Hall of India
3. A.M Law and W.D. Kelton, Simulation Modeling and Analysis, McGraw Hill.
4. A.M Law and R.F. Perry, Simulation: A Problem-solving approach, Addison Wesley Publishing Company.

Cloud Computing

Course Title: Cloud Computing
Course No: BIT408
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Credit Hrs: 3

Course Description:
The course introduces different concepts of cloud computing focusing on architectures, cloud virtualization, programming models, security, platforms and various applications of cloud computing.

Course Objectives:
The main objective of the course is to introduce fundamental concepts of cloud computing, its technologies, challenges and its applications, to give insight into virtualizations technologies and its architectures, and security in cloud.

Course Contents:

Unit 1: Introduction to Cloud Computing (3 Hrs.)
Overview and need of cloud computing, History of cloud computing, Cloud stakeholders, Cloud providers, Cloud users, End users, Characteristics and challenges of cloud computing, Benefits and limitations, Cloud computing, Grid Computing, Fog Computing

Unit 2: Cloud Service Models (7 Hrs.)
Introduction to cloud service models, SAAS, PAAS, IAAS, XAAS, Server less computing and FAAS model, Cloud deployment model (Private, Public, Hybrid), Cloud Platform (Introduction to Google Cloud Platform, Microsoft Azure, Sales Force, AWS)

Unit 3: Virtualizations (7 Hrs.)
Introduction to virtualization, Characteristics of virtualized environments, Types of virtualization (Server, Storage and Network), Machine Image, Virtual Machine, VMware, Hypervisor, Microsoft Hyper-V

Unit 4: SOA and Cloud Management (8 Hrs.)
Basic concepts of SOA, Web Services (SOAP, REST), Cloud governance, Cloud Availability and Disaster Recovery, Service Management, Data Management, Resource Management

Unit 5: Cloud Programming Models (10 Hrs.)
Thread programming, Task programming, Map-reduce programming, Parallel efficiency of Map Reduce, Comparison between Thread, task and Map reduce

Unit 6: Cloud Security (3 Hrs.)
Cloud security fundamentals, Cloud security architecture, Identity management and access control, Cloud computing security challenges, Elimination of intruders in private cloud,

Unit 7: Cloud Based Analytics (7 Hrs.)
Data cube, columnar storage, Data Lake, Graph processing, Graph database, Machine learning in the cloud, Fast data processing and streaming in the cloud

Laboratory Works:
The practical work consists of all features of cloud computing

References:

1. Raj Kumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, By Tim Mather, Subra Kumaraswamy, Shahed Latif, 2009
2. David S. Linthicum, Cloud Computing and SOA Convergence in your enterprise
3. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
4. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley,2011
5. Machine Learning Techniques and Analytics for Cloud Security (Advances in Learning Analytics for Intelligent Cloud-IoT Systems) 1st Edition, Edited by Rajdeep Chakraborty, Anupam Ghosh, Jyotsna Kumar Mandal, 2022

Marketing

Course Title: Marketing
Course No: MGT409
Nature of the Course: Theory + Lab
Semester: VII

Full Marks: 60 + 40
Pass Marks: 24 + 16
Credit Hrs: 3

Course Description:
The course includes topics that help students to understand marketing process and environment, information systems and buyer behavior, segmentation, targeting, and positioning strategies, and decisions related to product, pricing, distribution and promotion

Course Objectives:
The main objective of this course is to equip students with knowledge and skills of marketing.

Course Contents:

Unit 1: Introduction (6 Hrs.)
Meaning of Marketing, Core Concepts of Marketing, Marketing Process, Marketing Management Orientation - Production, Product, Selling, Marketing, and Societal Marketing Concepts, Meaning and Components of the Marketing Mix

Unit 2: Understanding Marketing Environment (4 Hrs.)
Meaning of Marketing Environment, Micro Environment: the Company, Suppliers, Competitors, Marketing Intermediaries, Publics, Customers. Macro Environment: Demographic, Economic, Natural, Technological, Political, Social, Cultural Environment; Responding to the Marketing Environment: Reactive and Proactive Marketing, Marketing Environment in Nepal

Unit 3: Marketing Information System (4 Hrs.)
Concept of Marketing Information System, Components of the Marketing Information System, Marketing Research Process and Areas of Marketing Research

Unit 4: Buyer Behavior (6 Hrs.)
Meaning of Buying Behavior, Model of Consumer Behavior, Consumer Buying Process, Factors Influencing Consumer Behavior, Business Buyer Behavior: Major Types of Buying Situation, Business Buyer Decision Process, Factors Influencing Business Buyer Behavior

Unit 5: Segmentation, Targeting and Positioning Strategies (4 Hrs.)
Concept, Process, Requirements of Market Segmentation, Bases for Segmenting Consumer and Organizational Markets, Segment Evaluation and Selection, Concept and Types of Positioning, Product Positioning Process

Unit 6: Product Decisions (8 Hrs.)
Concept and Levels of the Product, Product Classifications and Marketing Considerations, Product Life Cycle Stages: Features and Strategies, New Product Development Process, Branding Strategies: Branding Objectives, Types of Brand, and Concept of Brand Equity,

Packaging: Functions and Levels of Packaging, Essentials of a Good Package, Product Line and Mix Strategies, Service Product Strategies

Unit 7: Pricing Decisions (4 Hrs.)
Concept of Price and Pricing, Factors Affecting Pricing Decisions: Internal And External Price Factors, Pricing Approaches: Cost-Based, Value-Based and Competition- Based Approaches, New Product Pricing Decisions, Initiating and Responding to Price Changes, Pricing Practices in Nepal

Unit 8: Distribution Decisions (4 Hrs.)
Concept and Objectives of Distribution, Channel Designs for Consumer and Industrial Products, Channel Selection Factors, Concept and Components of Marketing Logistics: Transportation, Warehousing, Inventory Management, Order Processing, and Customer Services Decisions. Distribution Practices in Nepal

Unit 9: Promotion Decisions (5 Hrs.)
Concept and Objectives of Promotion, Promotion Mix Components, Factors affecting Determination of Promotion Mix, Advertising: Nature and Objectives, Nature and Process of Personal Selling, Nature and Objectives of Sales Promotions, Sales Promotion Tools and Techniques. Nature and Tools of Public Relations, Concept and Methods of Direct Marketing, Promotion Practices in Nepal

References:

1. Kotler and Armstrong, Principles of Marketing**,** Prentice Hall of India, New Delhi, India
2. Stanton, Etzel and Walker, Marketing, McGraw Hill, New Delhi, India