

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Principles of Management

Course Code: HU601

L-T Scheme: 2-1

Course Credits: 2

Introduction:

This course deals with the principles of Management within workplace. Students understand the intricacies of management that operates to extract work from the employees. Students dig into topics like:

- Basic concepts of Management
- Functions of Management
- Structure of Management
- How management and society are interlinked
- People Management
- Leadership concepts
- Quantitative methods
- Customer relations

Objectives:

This course briefs students on the mode of operandi for the employees and the mechanism tool for job at a workplace. Furthermore the handling of customers is an integral part of the course. This subject deals with the growth of an individual as an employee.

Learning Outcomes:

Knowledge:

1. Learning the various modes of operations for the management.
2. Customer handling and taking care of their needs and requirements keeping in mind the basic infrastructure of the company.
3. Managing people and their mode of work.
4. Understanding leadership skills that leads to growth of an individual.
5. Understanding the link between society and management and how to maintain a balance between the two.
6. Company's responsibility towards the society through CSR.
7. Quantitative Methods.

Course Contents:

Unit 1: Basic concepts of Management: Definition, essence, Functions, Roles, Level Functions of Management Planning: Concept, Nature, Types, Analysis, Management, objectives Structure: Concept, Structure, Principles, Centralization, Decentralization, Spn of Management, Organizational Effectiveness

Unit 2: Management and Society : Concept, external environment, CSR, Corporate Governance, Ethical Standards. People Management: Overview, Job design, Recruitment and Selection, Stress Management Managerial competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Enterprenuership.

Unit 3: Leadership concept: Nature, Styles, Decision Making, Process, Tools and Techniques. Economic, Financial and quantitative Analysis : Production Markets, National Income Accounting, Financial Function, and goals, Financial statements, Ratio Analysis.

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Course Description

Quantitative Methods: Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control

Unit 4: Customer Management: Market planning and research, Market Mix, Advertising and Brand Management. Operations and Technology Management: Production and Operations Management, Logistics, & supply chain Management.

TQM, Kaizen and Six Sigma, MIS.

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Course Description

Title of Course: Database Management System

Course Code: CS601

L-T Scheme: 3-1

Course Credits: 3

Introduction

Database Management Systems (DBMS) consists of a set of interrelated data and a set of programs to access that data. They underpin any computer system and are therefore fundamental to any program of study in computer science. An understanding of DBMS is crucial in order to appreciate the limitations of data storage and application behavior and to identify why performance problems arise.

Students who complete this course are expected to develop the ability to design, implement and manipulate databases. Students will apply and build databases for various day to day real life scenarios and real life applications. The course will by and large be structured but will introduce open-ended data base problems.

Course Objectives:

- Ability to build normalized databases.
- Knowledge of Entity Relationship Modeling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues.
- Familiarity with ODBC, JDBC.

Outcomes:

- Develop the ability to design, implement and manipulate databases.
- Introduce students to build database management systems.
- Apply DBMS concepts to various examples and real life applications.

Expected Student Background (Preconditions)

- Introduction to any programming language (Preferably, C)
- Data Structures

Course Contents:

Unit 1: Introduction to DBMS- Concept & overview of DBMS, Data Models & database Language, Database Administrator, Database Users, architecture of DBMS, Three levels of abstraction.

Unit 2: Entity Relationship Model – Basic concepts, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

Relational Model-

Structure of relational Databases, Relational Algebra, Relational Algebra Operations, Views, Modifications of the Database.

Unit 3: SQL and Integrity Constraints: Concept of DDL, DML, DCL ,Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries.

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Unit 4: Relational Database Design: -Functional Dependency, Different anomalies in designing a Database, Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF.

Unit 5: Transaction: -Transaction concept, transaction model, serializability, transaction isolation level, Transaction atomicity and durability, transaction isolation and atomicity.

Concurrency control and recovery system:

Lock based protocol, dead lock handling, time stamp based and validation based protocol, failure classification, storage, recovery algorithm, recovery and atomicity, backup.

Unit 6: Internals of RDBMS:-Physical data structures, Query optimization: join algorithm, Statistics and cost based optimization.

Unit 7: File Organization & Index Structures:-File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

Text Books:

1. Silberschatz, Korth and Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2010
2. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson, Addison-Wesley, 2010

References:

1. C.J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003
2. Ramakrishnan & Gherke, Database Management Systems, 2nd Edn., McGraw
3. Connolly and Begg, "Database Systems", 4th Edn., Addison-Wesley, 2005
4. Toby, Lightstone and Jagadish, "Database Modeling and Design", 5th Edn, Elsevier, 2011
5. Coronel and Rob, "Database Systems", 9th Edn., Cengage, 2011
6. IEEE / ACM Transactions on Database Systems (TODS).
7. DBMS related Journals.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer Networks

Course Code: CS602

L-T Scheme: 3-1

Course Credits:3

Introduction:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols. The course is supplemented by a practical component covered in CS692 concurrently.

Objectives:

At the end of the course, the students will be able to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
8. Analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP.

Application:

1. To configure and implement network topology.
2. To configure and implement local area network.
3. To design network and assign IP address
4. Connect Remote computers
5. Analyze the network.

Course Contents:

Unit-1:

Introduction; Data communications: components, data representation (ASCII,ISO etc.),direction of data flow(simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

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Physical layer:

Overview of data(analog & digital), signal(analog & digital), transmission (analog & digital)& transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network;

Unit-2:

Data link layer:

Types of errors, framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

Medium access sub layer:

Point to point protocol, LCP, NCP, FDDI, token bus,token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet;

Unit-3:

Network layer:

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques,static vs. dynamic routing , routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

Transport layer:

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.

Unit-4:

Application layer:

DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Modern topics:

ISDN services & ATM ; DSL technology, Cable modem, SONET. Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, data Communication & Network, Vikas

Reference Books:

1. Kurose and Rose – “ Computer Networking -A top down approach featuring the internet” – Pearson Education
2. Leon, Garica, Widjaja – “Communication Networks” – TMH
3. Walrand – “Communication Networks” – TMH.
4. Comer – “Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)” – Pearson Education/PHI

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Course Description

Title of Course: Operating System

Course Code: CS603

L-T Scheme: 3-1

Course Credits: 3

Introduction:

This course examines operating system design concepts, data structures and algorithms, and systems programming basics. The Topics to be covered (tentatively) include:

- Computer and operating system structures
- Process and thread management
- Process synchronization and communication
- Memory management
- Virtual memory
- File system
- I/O subsystem and device management
- Selected examples in networking, protection and security

Objectives:

In this course we will study the basic components of an operating system, their functions, mechanisms, policies and techniques used in their implementation and examples from popular operating systems. The way different modules in the operating system interact and work together to provide the basic services of an operating system.

Learning Outcomes:

Knowledge:

1. Understand the theory and logic behind the design and construction of operating systems.
2. You will examine the algorithms used for various operations on operating systems.
3. You will differentiate between various operating systems functionalities in terms of performance.
4. Become aware of the issues in the management of resources like processor, memory and input-output.
5. Know the problems in the design of operating system and study the probable solutions.
6. Learn to calculate the performance of cpu scheduling and disk scheduling
7. Learn File systems and methods of accessing
8. Understanding various security threats
9. An overview of advanced operating systems and compare the technical aspects of all the advanced operating systems

Application:

1. To develop, implement, and debug various CPU scheduling algorithms
2. To develop, implement, and demonstrate the algorithms of synchronizing the processes
3. To develop algorithms to find deadlocks
4. To develop Disk scheduling algorithms

Course Contents:

Unit 1: Introduction, Operating system structure - Monolithic systems, Layered systems, Virtual machines, Client-Server model.

Unit 2: Process Management – process creation, deletion, inter process communication tools: pipe, FIFO, shared memory, process synchronization, synchronization primitives and Classical IPC problems.

Unit 3: Process scheduling, Processor Allocation - Allocation Model, Design issues for processor allocation algorithms, Threads and Deadlock.

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Unit 4: Memory Management, paging scheme, segmentation, virtual memory concept, page replacement algorithms, thrashing, working set model, issues in Virtual memory management.

Unit 5: File System management. Input output management, Disk scheduling, Case study of UNIX/LINUX.

Text Books

1. Silberschatz, P. Galvin and Greg Gagne, “Operating System Concepts”, Wiley International Company.
2. A.S. Tanenbaum, Modern Operating Systems, Prentice Hall India.

References

1. J. Archer Harris, Operating systems – Schuam’s outlines, Tata Mc Graw Hill.
2. Gary Nutt, Operating Systems – A modern perspective, Pearson Education.

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Course Description

Title of Course: Information Theory & Coding

Course Code: CS604A

L-T-P Scheme: 3-0-0

Course Credits: 3

Introduction:

Most scientists agree that information theory began in 1948 with Shannon's famous article. In that paper, he provided answers to the following questions :

- What is "information" and how to measure it?
- What are the fundamental limits on the storage and the transmission of information?

The answers were both satisfying and surprising, and moreover striking in their ability to reduce complicated problems to simple analytical forms.

Since then, information theory has kept on designing devices that reach or approach these limits.

Objectives:

The aims of this course are to introduce the principles and applications of information theory. The course will study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies; how these are used to calculate the capacity of a communication channel, with and without noise; coding schemes, including error correcting codes; how discrete channels and measures of information generalise to their continuous forms; the Fourier perspective; and extensions to wavelets, complexity, compression, and efficient coding of audio-visual information.

Learning Outcomes:

At the end of the course students should be able to

- calculate the information content of a random variable from its probability distribution
- relate the joint, conditional, and marginal entropies of variables in terms of their coupled probabilities
- define channel capacities and properties using Shannon's Theorems
- construct efficient codes for data on imperfect communication channels
- generalise the discrete concepts to continuous signals on continuous channels
- understand Fourier Transforms and the main ideas of efficient algorithms for them
- describe the information resolution and compression properties of wavelets

Application :

- Data compression
- Error-correcting and error-detecting codes
- Cryptology
- Linguistics

Course Contents:

Unit 1:Source Coding

Uncertainty and information, average mutual information and entropy, information measures for continuous random variables, source coding theorem, Huffman codes.

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Unit 2: Channel Capacity And Coding

Channel models, channel capacity, channel coding, information capacity theorem, The Shannon limit.

Unit 3: Linear And Block Codes For Error Correction

Matrix description of linear block codes, equivalent codes, parity check matrix, decoding of a linear block code, perfect codes, Hamming codes.

Unit 4: Cyclic Codes

Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, Golay codes.

Unit 5: BCH Codes

Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes.

Unit 6 : Convolutional Codes

Tree codes, trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, the generating function, matrix representation of convolutional codes, decoding of convolutional codes, distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding.

Text Books

1. Information theory, coding and cryptography - Ranjan Bose; TMH.
2. Information and Coding - N Abramson; McGraw Hill.
3. Introduction to Information Theory - M Mansurpur; McGraw Hill.
4. Information Theory - R B Ash; Prentice Hall.
5. Error Control Coding - Shu Lin and D J Costello Jr; Prentice Hall.

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Course Description

Title of Course: Computer Graphics

Course Code: CS604B

L-T Scheme: 3-0

Course Credits: 3

Introduction:

This course presents an introduction to computer graphics designed to give the student an overview of fundamental principles. It covers the fundamental concepts in creating graphical images on the computer. Computer graphics uses ideas from Art, Mathematics, and Computer Science to create images. Course work stresses the reduction of concepts to practice in the form of numerous programming assignments. The course will include an overview of common graphics hardware, 2D and 3D transformations and viewing and basic raster graphics concepts such as scan-conversion and clipping. Methods for modeling objects as polygonal meshes or smooth surfaces, and as rendering such as hidden-surface removal, shading, illumination and shadows will be investigated.

Objectives:

This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues and trends. A thorough introduction to computer graphics techniques, focusing on 3D modelling, image synthesis, and rendering. We will look at raster scan graphics including line and circle drawing, polygon filling, anti-aliasing algorithms, clipping, hidden-line and hidden surface algorithms including ray tracing and of course, rendering the art of making photo realistic pictures with local and global illumination models. The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.

Learning Outcomes:

Knowledge:

1. To know and be able to understand the core concepts of computer graphics.
2. To know and be capable of using OpenGL to create interactive computer graphics.
3. To know and be able to understand a typical graphics pipeline.
4. To know and be able to make interactive graphics applications in C++ using one or more graphics application programming interfaces.
5. To know and be able to demonstrate an understanding of the use of object hierarchy in graphics applications.
6. To know and be able to write program functions to implement visibility detection.
7. To know and be able to make pictures with their computer.
8. To know and be able to describe the general software architecture of programs that use 3D computer graphics

Application:

1. Know and be able to discuss hardware system architecture for computer graphics. This includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.
2. Know and be able to use a current 3D graphics API (e.g., OpenGL or DirectX).
3. Know and be able to use the underlying algorithms, mathematical concepts, supporting computer graphics. These include but are not limited to:

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- Composite 3D homogeneous matrices for translation, rotation, and scaling transformations.
 - Plane, surface normals, cross and dot products.
 - Hidden surface detection / removal.
 - Scene graphs, display lists.
4. Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
 5. Know and be able to use and select among current models for surfaces (e.g., geometric; polygonal; hierarchical; mesh; curves, splines, and NURBS; particle.
 6. Know and be able to design and implement model and viewing transformations, the graphics pipeline and an interactive render loop with a 3D graphics API.
 7. Be able to design and implement models of surfaces, lights, sounds, and textures (with texture transformations) using a 3D graphics API.
 8. Be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
 9. Be able to discuss future trends in computer graphics and quickly learn future computer graphics concepts and APIs.

Course Contents:

Unit 1: Introduction to computer graphics & graphics systems

Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

Scan conversion

Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line drawing algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Unit 2: 2D transformation & viewing

Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping algorithm, Sutherland-Hodgeman Polygon clipping algorithm, Cyrus-beck clipping method.

3D transformation & viewing

3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.

Unit 3: Curves

Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden surfaces

Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal-geometry.

Introduction to Ray-tracing

Human vision and color, Lighting, Reflection and transmission models.

Text Books

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Course Description

1. Hearn, Baker – “Computer Graphics (C version 2nd Ed.)” – Pearson education
2. Z. Xiang, R. Plastock – “Schaum’s outlines Computer Graphics (2nd Ed.)” – TMH
3. D. F. Rogers, J. A. Adams – “Mathematical Elements for Computer Graphics (2nd Ed.)” –TMH
4. Mukhopadhyay, Chottopadhyay - “Introduction to Computer Graphics and Multimedia”- VIKAS

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Course Description

Title of Course: Multimedia Technology

Course Code: CS604C

L-T Scheme: 3-0

Course Credits: 3

Introduction:

This course examines Multimedia design concepts, presentation and techniques

The Topics to be covered (tentatively) include:

- Multimedia and its real life applications.
- Analog and digital conversion process and hardware requirement of multimedia system
- Various Media and their characteristics, presentation , file format
- Various media storage
- Content design and development using computer languages.

Objectives:

In this course we will study the basic components of an multimedia, their applications, functions, mechanisms, policies and techniques used in their implementation and examples from popular multimedia systems. The way different modules in the multimedia interact and work together to provide the basic services of a multimedia.

Learning Outcomes:

Knowledge:

1. You can get information regarding what multimedia is today and its impact on human life.
2. Understand the theory multimedia systems, their applications and components.
3. You will study various types of media and their characteristics.
4. You can get the idea about various multimedia file formats.
5. You can get the knowledge about content design and development.
6. Familiarization with interactive TV, High Definition TV.

Application:

1. To develop and implement a range of concepts, techniques and tools for creating and editing the interactive multimedia applications.
2. To develop the current and future issues related to multimedia technology.
3. To design multimedia systems surrounding the emergence of multimedia technologies using contemporary hardware and software technologies.

Course Contents:

Unit 1: Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications.

Unit 2: Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI.

Unit 3: Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.

Unit 4: Temporal relationships, synchronization accuracy specification factors, quality of service.

Unit 5: Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices- Output devices, CD-ROM, DVD, Scanner, CCD.

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Unit 5: Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, R-trees, quad trees; Case studies- QBIC, Virage.Video Content, querying, video segmentation, indexing.

Unit 6: Content Design and Development, General Design Principles Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language(HTML) in Web Publishing. Case study of Applications.

Unit 7: Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Text Books

1. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing , Communications & Applications , Pearson Ed.
2. Nalin K. Sharda, Multimedia Information System, PHI

References

1. Fred Halsall , Multimedia Communications, Pearson Ed.
2. Koegel Buford , Multimedia Communications, Pearson ed.

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Course Description

Title of Course: Operation Research

Course Code: CS-605A

L-T Scheme: 3-0

Course Credits: 3

Introduction:

The goal of this course is to provide a very common simple intuition enables one to make right decisions and especially show how mathematics is applied to solve fundamental engineering problems. The Topics to be covered (tentatively) include:

Linear programming problems

Transportation and Assignments problems

Inventory Controls

Game Theory

Network Analysis

Queue Theory

Course Objectives:

It lays the required foundation and skills that can be repeatedly employed in subsequent courses at higher levels. Students will acquire the skills and techniques of:

1. Discuss about algebraic solution of the linear problem with certain constrains.
2. Obtain the optimal solution of Transportation and Assignment problems.
3. Discuss about Network Analysis problems.
4. Discuss about six main factor of waiting line.
5. Solve the Nonlinear Programming problems.

Learning Outcomes:

Knowledge:

1. Student completing the first unit of this course would be expected to find the solution of linear programming problems using Graphical method and simplex method.
2. At the end of second unit student will be able to assign different jobs to the different person to have the optimum efficiency of working and similar in transportation problems.
3. After the completion of the third unit, student will be able to calculate the shortest path of the graph by several methods and Algorithms.
4. At the end of forth unit student will be able find the optimal no. of servers such that the sum of cost of service and waiting is minimized.
5. At Student completing the fifth unit of this course would be expected to find the solution of Nonlinear programming problems using several methods.

Application:

1. First unit of this course would be expected to formulate and solve the linear programming problems with the given constrains.

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2. Student will be able to assign different jobs to the different person to have the optimum efficiency of working and similar in transportation problems.
3. Third unit student will be able to calculate the shortest path of the graph by several methods and Algorithms.
4. Forth unit student will be able find the optimal no. of servers such that the sum of cost of service and waiting is minimized.

Course Contents:

Unit: 1 (Linear Programming Problems)

Basic LPP and Applications, LP Problem Formulation, Simultaneous Equations and Graphical Method, Simplex Method, Big-M Method, Duality Theory, Transportation Problems and Assignment Problem

Unit 2: (Network Analysis)

Shortest Path; Floyd Algorithm, Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded).

Unit 3: (Inventory Control):

Introduction to EOQ Models of Deterministic and Probabilistic, Safety Stock; Buffer Stock.

Unit 4: (Game Theory):

Introduction; 2-Person Zero – sum Game; Saddle Point; Mini – Max and Maxi – Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance.

Unit 5: (Queuing Theory):

Introduction, Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1:∞/FIFO) and (M/M/1:N/FIFO).

Text Books:

1. H.A.Taha, “Operations Research”, Pearson
2. P. M.Karak–“Linear Programming and Theory of Games”, ABS Publishing House
3. Ghosh and Chakraborty, “Linear Programming and Theory of Games”, Central Book Agency
4. Ravindran, Philips and Solberg- “Operations Research”, WILEY INDIA

References:

1. Kanti Swaroop— “Operations Research”, Sultan Chand & Sons
2. Rathindra P.Sen—“Operations Research: Algorithms and Applications”, PHI
3. R. Panneerselvam- “Operations Research”, PHI
4. A.M.Natarajan, P.Balasubramani and A.Tamilarasi- “Operations Research”, Pearson
5. M.V.Durga Prasad–“Operations Research”, CENGAGE Learning
6. J. K.Sharma- “Operations Research”, Macmillan Publishing Company

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Human Resource Management

Course Code: CS605B

Contact: 3L

Course Credits: 3

Introduction:

Of all the resources available to human endeavour, it is perhaps ironically the 'human resource' which most often presents the greatest perplexities to managers. Just as some business leaders might argue that it is the organization's most important resource, others may assert that it is also its most nebulous. As organizations today continuously strive to keep abreast of their rapidly changing business environments they are coming to understand that human resource management (HRM) must assume an increasingly important role within their operations and planning. This course will attempt to take a broad view on Human Resources while introducing the current theories that inform the discipline. It will introduce the student to current HRM concepts, skills, and practices and will detail both hands-on HR applications, and high level strategic thinking within the field. Topics are listed below in the calendar.

Learning Outcomes:

- After successfully completing this course, students will be able to:
- Develop the knowledge, skills and concepts needed to resolve actual human resource management problems or issues.
- Manage the employment relationship, which is a shared responsibility between employers, management, human resources specialists, and employees. Investigate how HRM is responding to current business trends, opportunities, and challenges.
- Identify the human resources needs of an organization or department.
- Conduct a job analysis and produce a job description from the job analysis.
- Evaluate the procedures and practices used for recruiting and selecting suitable employees.
- Assess training requirements and design a successful orientation and training program.
- Discuss workplace health and safety programs and the roles of the employer and the employee in enforcing health and safety policies and procedures.
- Explain the responsibilities of management, HRM specialists, managers, and employees in managing the employment relationship in a unionized or a non-unionized environment.

Course Content:

Unit-1:

Introduction: HR Role and Functions, Concept and Significance of HR, Changing role of HR managers - HR functions and Global Environment, role of a HR Manager.

Unit-2:

Human Resources Planning: HR Planning and Recruitment: Planning Process - planning at different levels - Job Analysis - Recruitment and selection processes - Restructuring strategies - Recruitment-Sources of Recruitment-Selection Process-Placement and Induction-Retention of Employees.

Unit-3:

Training and Development : need for skill up gradation - Assessment of training needs - Retraining and Redeployment methods and techniques of training employees and executives - performance appraisal systems.

Unit-4:

Performance Management System : Definition, Concepts and Ethics-Different methods of Performance Appraisal- Rating Errors- Competency management.

Unit-5:

Industrial Relations : Factors influencing industrial relations - State Interventions and Legal Framework - Role of Trade unions - Collective Bargaining - Workers' participation in management.

Case study.

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Course Description

Books :

1. Gary Dessler, Human Resource Management - (8th ed.,) Pearson Education, Delhi
2. Decenzo & Robbins, Personnel / Human Resource Management, 3rd ed., John Wiley & Sons (Pvt.) Ltd.
3. Biswajeet Patanayak, Human Resource Management, PHI, New Delhi
4. Luis R. Gomez, Mejia, Balkin and Cardy, Managing Human Resources PHI, New Delhi.

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Course Description

Title of Course: Enterprise Resource Planning

Course Code: CS605C

L-T Scheme: 3-1

Course Credits: 3

Introduction:

This course examines ERP concepts and systems basics. The Topics to be covered (tentatively) include:

- Overview of ERP
- Information Technology and ERP systems
- Implementation of ERP system
- Emerging Trends and Future of ERP systems

Objectives:

In this course we will study the basic components of an ERP, their functions, policies and techniques used in their implementation and examples from popular ERP. Case studies to realize the importance of ERP.

Learning Outcomes:

Knowledge:

Upon successful completion of the course student should be able to:

1. Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components.
2. To understand concepts of reengineering and how they relate to ERP system implementations
3. Understand production planning in an ERP system, and systematically develop plans for an enterprise.
4. Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
5. To understand the steps and activities in the ERP life cycle.
6. To be able to identify and describe typical functionality in an ERP system.

Application:

1. To develop, implement, and debug various ERP applications.
2. To develop, implement, and demonstrate the ERP systems.
4. To develop Emerging Technologies and ERP.

Course Contents:

Unit 1: The evolution of ERP systems: A historical perspective

Evolution through Payroll system, Inventory Control system, Materials Requirement Planning (MRPI) system, Manufacturing Resource Planning(MRP II) system, Their advantages and disadvantages. Definition and Concept of ERP, Business reasons for rise and popularity of ERP system- Benefits of an ERP system

Business processes supported by ERP systems

Various business functions in an Organization–Purchasing, Materials Management, Manufacturing, Sales & Distribution, Plant Maintenance, Quality Management, Finance & Accounting including Costing, Human Resources etc.

ERP market place– SAP, Oracle, PeopleSoft, JD Edwards, Baan, Microsoft's suit of products etc.

Business modules in these ERP packages–a brief comparative description of business function modules and sub-modules.

Overview of key end-to-end business processes supported in two major ERP systems(preferably SAP and Oracle)–Order to Cash, Procure to Pay, Plan to Produce and Dispatch.

Unit 2: The evolution of Information Technology(IT): A historical perspective

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Course Description

Evolution of computer generations (hardware and software)– Operating systems, File systems to Database Management systems, Communication Networks. Enabling of ERP systems by IT evolution.

The evolution of ERP systems architecture

Client-Server based architecture, Multi-Tier architecture–Presentation layer, Application layer, and Database layer(On- line Transaction Processing–OLTP).Brief discussion on Extended ERP systems-Web-enabled ERP architecture, Service-Oriented Architecture and Cloud Computing. Open Source ERP.

Related technology concepts

ERP and Supply Chain Management(SCM),and Customer Relationship Management(CRM),ERP and Business Intelligence(some of the popular tools like Cognos, Business Objects should be mentioned),ERP and Data warehousing (Data Mart, Data Mining and On-line Analytical Processing- OLAP),ERP and E-business.

Unit 3: Types of services required in implementation–Consulting, Configuration, Customization and Support

ERP implementation approach

Single vendor versus Best-of Breed ERP implementation, Big Bang versus Phased (by module/site) implementation, Using ERP of Application Service Provider(ASP).

ERP implementation life cycle

Planning different aspects (Economic viability, Senior Management commitment, Resource requirements, Change managementetc.),UnderstandingrequirementsandProcesspreparation–Gap analysis and Business Process Engineering, User Acceptance criteria, Design, Configuration, Customization (difference between Configuration and Customization, advantages and disadvantages), Extensions, Data migration, End-user training, User Acceptance, Going live, Roll-out. Differences between ERP implementation life cycle and Custom Software development phases. Draw backs of ERP system.

Organizing implementation

Interaction with Vendors, Consultants, and Users. Contracts with Vendors, Consultants, and Employees. Project Management and Monitoring. ERP Project Organization–Formation of Steering Committee and different User Groups. Top Management Commitment and Steering Committee meetings. Change Management, Risks and Challenges in ERP implementation.

Post-implementation Support, Review, Maintenance and Security of ERP systems

A typical Support Cycle(Planning, Stabilization, Ongoing and Upgrade phases).Post-implementation Review of ERP systems–measures of review(Efficiency, Effectiveness, and Competitive Advantage),and approaches for review(User attitude survey, Cost/benefit analysis, Compliance audit, Budget performance review, Service level monitoring, Technical review, Product review, Integration review etc.).System maintenance and ERP system maintenance. Software upgrade (patch, release, version).Security and Access control of ERP systems .

Unit 4: Emerging Technologies and ERP

*Service-orientedArchitecture(SOA):*EnterpriseSOA layers–Businessprocesses, Business services, Components and Integration services, Advantages and Drawbacks of SOA , When to use SOA, Difference between multi-layered Client-server architecture and SOA, basic awareness of Net Weaver from SAP, Web sphere from Oracle and .Net from Microsoft.

Enterprise Application Integration(EAI): Basic understanding of the concept, Types of EAI(levels)–User Interface, Method(logic), Application Interface, Data.

EAI architecture–Typical framework(Business Processes, Components &Services ,Messaging service and Transport service. Mention of some of the leading EAI vendors–IBM, Microsoft, Oracle, SAP,TIBCO.

Radio Frequency Identification(RFID) and ERP: awareness of RFID technology, Benefits of RFID integrated with ERPs.

M-Commerce: basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.

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Course Description

Future of ERP

Technology transformation to SOA, more E-Commerce features, Growing mobile applications ,Economical and Easy models of ERP deployment etc.

Text Books

1. Enterprise Resource Planning–A Managerial Perspective by DP Goyal, Tata McGraw Hill Education, 2011.
2. E Business and ERP, Author Sheilds, Murell G, John Wiley and Sons Inc, Edition 1st Edition

References

1. Enterprise Resource Planning, 2nd Edition by Alexis Leon, Tata McGraw Hill Education,2008 .

Magazines/Journals (Minimum 4)

- (i) Shaul L and Tanber D CSF along ERP Life cycle in SMEs: a field study Industrial management & Data systems 112 (3),2012
- (ii) King w. ‘Ensuring ERP implementation success information system Managements summer 2005.
- (iii) Thomson H. Davenport putting the Enterprise into the Enterprise system, Harvard Business Review, July-Auguest,1998
- (iv) Gill,R ‘The Rise of two-tier ERP’ Strategic Finance,93(5) 35-40,2011

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Course Description

Title of Course: Database Management System Lab

Course Code: CS691

L-T-P Scheme: 0-0-3

Course Credits: 2

Objective:

At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared database including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL. In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user. All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques. One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Learning Outcomes:

- Ability to build normalized databases.
- Knowledge of Entity Relationship Modelling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues.
- Familiarity with ODBC, JDBC.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1:ER Model: An entity-relationship model (ERM) is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system

Exercise No. 2:EER Model: In computer science, the enhanced entity-relationship (EER) model is a high-level or conceptual data model incorporating extensions to the original entity-relationship (ER) model, used in the design of databases. It was developed by a need to reflect more precisely properties and constraints that are found in more complex databases.

Exercise No. 3:Relational Model: The relational model for database management is a database model based on first-order 4predicate logic, first formulated and proposed in 1969 by E.F. Codd. The model uses the concept of a mathematical relation, which looks somewhat like a table of values - as its basic building block, and has its theoretical basis in set theory and first-order predicate logic.

Exercise No. 4:1 NF: First normal form (1NF or Minimal Form) is a normal form used in database normalization. A relational database table that adheres to 1NF is one that meets a certain minimum set

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of criteria. These criteria are basically concerned with ensuring that the table is a faithful representation of a relation and that it is free of repeating groups.

Exercise No. 5: 2NF: Second normal form (2NF) is a normal form used in database normalization. 2NF was originally defined by E.F. Codd in 1971. A table that is in first normal form (1NF) must

Exercise No. 6: 3NF: The Third normal form (3NF) is an important form of database normalization. 3NF is said to hold if and only if both of the following conditions hold:

- The relation R (table) is in second normal form (2NF)
- Every non-prime attribute of R is non-transitively dependent (i.e. directly dependent) on every candidate key of R.

Exercise No. 7: BCNF: A relation R is in Boyce-Codd normal form (BCNF) if and only if every determinant is a candidate key. The definition of BCNF addresses certain (rather unlikely) situations which 3NF does not handle.

Exercise No. 8: SQL-1: In this lab., we discuss basic SQL operations like creating a table, deleting a table, changing the schema of the table, primary key and foreign key constraints on a table and creating indexes on tables.

Exercise No. 9: SQL-2: Its scope includes efficient data insert, query, update and delete, schema creation and modification, and data access control. In this lab., we discuss SQL operations for populating the tables like inserting into a table, deleting values from a table, and updating the content of the tables.

References

1. "Database Systems: A Practical Approach to design, Implementation and Management". Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
3. Bipin C Desai, "An Introduction to Database Systems", Galgotia. Publications Pvt Limited, 2001
4. "An Introduction to Database Systems", C.J.Date, Pearson Education.
5. "A first course in Database Systems", Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
6. "Data Management: databases and organization", Richard T. Watson, Wiley.
7. "Data Modeling Essentials", Graeme C. Simxion, Dreamtech.
8. Introduction to Data Base Management, Naveen Prakash, Tata McGraw Hill
9. "Oracle 10g manuals".

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Course Description

Title of Course: Computer Networks Lab

Course Code: CS692

L-T-P scheme: 0-0-3

Course Credit: 2

Objectives:

This practical course provides students with hands on training regarding the design, troubleshooting, modeling and evaluation of computer networks. In this course, students are going to experiment in a real and simulation based test-bed networking environment, and learn about network design and troubleshooting topics and tools such as: network addressing, Address Resolution Protocol, basic troubleshooting tools (like ping, ICMP), IP routing (e.g. RIP), TCP and UDP, DHCP, ACL and many others. Student will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performance.

Learning Outcomes: The students will have a detailed knowledge network topology, Local area network, IP addressing, familiarization with network simulator, idea about networking devices, network cable and connectors, different types routing protocols, concept of remote access and different types of application layer protocol. Upon the completion of Computer network practical course, the student will be able to:

- **Learn** various network commands.
- **Understand** and implement basic of Network and Network Topology.
- **To get** idea about IP addressing schemes.
- **Understand** the benefits of network.
- **Configure** and simulate various protocols.
- **Access** remote desktop.
- **Connect** to different computer using LAN.
- **Understand** the concepts of access control.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Study of different types of Network cables and practically implements the cross-wired cable and straight through cable using clamping tool.

Exercise No. 2: Familiarization with some network devices.

Exercise No. 3: Study of Network IP.

Exercise No. 4: Connect the computers in LAN.

Exercise No. 5: Introduction to Packet Tracer.

Exercise No. 6: Configure network topology using packet tracer.

Exercise No. 7: Configure network topology using packet tracer to find the routing path by IPRoute Command.

Exercise No. 8: Network Configuration using distance vector routing protocol.

Exercise No. 9: Configuration of DHCP Protocol

Exercise No. 10: Telnet Configuration.

Exercise No. 11: Configuration of Access Control List.

Text Book:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.) “ – TMH

Reference Book:

1. Authorized Self-Study Guide “Interconnecting Cisco Network Devices, Part 1(ICND1), 2nd Edition, January, 2008.

Recommended Systems/Software Requirements:

1. CAT-5/CAT-6 Cables, RJ 45, Cutter, Clamping Tool, Router , Switch and Hub.
2. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
3. Turbo C or TC3 compiler in Windows XP or Linux Operating System.

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Course Description

Title of Course: Operating System Lab

Course Code: CS693

L-T-P scheme: 0-0-3

Course Credit: 2

Objectives:

1. To learn and understand system calls related to files, processes, signals, semaphores and implement system programs based on that.
2. To provide an understanding of the design aspects of operating system.
3. To provide an efficient understanding of the language translation peculiarities by designing a complete translator for a mini language.

Learning Outcomes: The students will have a detailed knowledge of the concepts of process and shared memory, aware of a variety of approaches to process management and main-memory management, including interference, deadlock, scheduling, fragmentation, thrashing, learn the basics behind file systems and input output systems and understand the fundamentals of network and distributed operating systems. Upon the completion of Operating Systems practical course, the student will be able to:

- **Understand** and implement basic services and functionalities of the operating system using system calls.
- **Use** modern operating system calls and synchronization libraries in software/ hardware interfaces.
- **Understand** the benefits of thread over process and implement synchronized programs using multithreading concepts.
- **Analyze** and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
- **Implement** memory management schemes and page replacement schemes.
- **Simulate** file allocation and organization techniques.
- **Understand** the concepts of deadlock in operating systems and implement them in multiprogramming system.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: CPU scheduling

Exercise No. 2: File allocation Strategy

Exercise No. 3: Simulate MVT, MFT(Multiprogramming Fixed and Variable)

Exercise No. 4: Simulate all File Organization Techniques

Exercise No. 5: Simulate Banker's Algorithm for Dead Lock Avoidance

Exercise No. 6: Simulate Banker's Algorithm for Dead Lock Prevention

Exercise No. 7: Simulate all page replacement Strategies

Exercise No. 8: Simulate Paging Technique of Memory Management

Exercise No. 9: Shell programming

Exercise No. 10: Process

Text Book:

1. Maurice J. Bach, Design of the UNIX Operating System, PHI.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Turbo C or TC3 compiler in Windows XP or Linux Operating System.

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Course Description

Title of Course: Seminar

Course Code: CS681

L-T –P Scheme: 0-0-3

Course Credits: 2

Course Description & Objectives:

1. Understand the diverse social and economic, racial and gender contexts within which Henrietta Lacks lived and died. Understand the themes of this seminar. Appreciate the legacy and implications of these medical, ethical and social understandings on today's society.
2. **Identify**, understand and discuss current, real-world issues.
3. **Distinguish** and **integrate** differing forms of knowledge and academic disciplinary approaches (e.g., humanities and sciences) with that of the student's own academic discipline (e.g., in agriculture, architecture, art, business, economics, education, engineering, natural resources, etc.). And apply a **multidisciplinary strategy** to address current, real-world **issues**.
4. Improve oral and written **communication** skills.
5. Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts.
6. Apply principles of **ethics** and **respect** in interaction with others.

Course Outcomes:

After the completion of this course, the student should be able to:

1. **Learn and integrate.** *Through independent learning and collaborative study, attain, use, and develop knowledge in the arts, humanities, sciences, and social sciences, with disciplinary specialization and the ability to integrate information across disciplines.*
2. *Use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequential decisions*
3. **Learn and integrate.** Communicate. *Acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication that demonstrates respect and understanding in a complex society.*
4. *Use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequential decisions.*
5. **Clarify purpose and perspective.** *Explore one's life purpose and meaning through transformational experiences that foster an understanding ofself, relationships, and diverse global perspectives.*

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Course Description

6. **Practice citizenship.** *Apply principles of ethical leadership, collaborative engagement, socially responsible behavior, respect for diversity in an interdependent world, and a service-oriented commitment to advance and sustain local and global communities.*