UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Advanced Networking & Communication
Course Code: BCA601A
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course is to provide students with an overview of the concepts and advanced knowledge of data communication, computer networks and mobile computing. 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, introduction to mobile technology.

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. A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities.
9. The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.

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.
6. To configure Adhoc network
7. Experiment with Bluetooth Technology
8. Experiment with GPRS
8. Experiment with CDMA and GSM Mobile

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Course Description

Course Contents:

Unit 1: Introduction to computer network- Topology; Base Band & Broad Band Topology; Guided & Unguided Media. Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM); Multiplexing (TDM, FDM, STDM).Encoding (RZ, NRZ, BIPLOAR, MANCHESTER, DIFF. MANCHESTER).

Unit 2: Digital To Analog – ASK, PSK, FSK, QPSK. Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods.

Unit 3: Goals of Layered protocols- Introduction to OSI, TCP/IP, IBM, SNA, ATM. Bit oriented (BSC) & Character oriented Protocol (SDLC, LAPB, LAPD, LLC) HDLC- frame format, station, states, configuration, access control.

Unit 4: LAN Topology – Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)

Introduction to WAN – DQDB (IEEE 802.6) & FDDI.

Unit 5: Switching Technologies – Circuit, Message, and Packet. X.25, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief Only). ISDN- D channel, B-Channel, International Standards,NT1, NT2, TA, TE Devices. Introduction to leased lines, DSL, Digital Carriers. Bridging & Routing – Static & Dynamic (In Brief).

Unit 6: IP, IP addressing, ICMP, ARP.RARP.

Unit 7: Congestion Control, TCP, UDP.

Unit 8: HTTP, FTP, Telnet, SMTP.

Unit 9: Introduction to data security (private key, public key, ISO standards).

Unit 10: Introduction to Mobile technology (Topology, FDM, TDM, CDMA), Satellite Communication (LEO, GEO, TDM).

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.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Artificial Intelligence
Course Code: BCA601B
L-T Scheme: 3-0 **Course Credits: 3**

Objectives: In this course we will study the basic components of an intelligent system, their functions, mechanisms, policies and techniques used in their implementation and examples.

Learning Outcomes: The students will have a detailed knowledge of the concepts of artificial intelligence, various applications of AI in different fields, Aware of a variety of approaches to AI techniques

Course Contents:
Unit-1 (Introduction to AI): Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI. Introduction of Intelligent Systems: Agents and Environments, Good Behavior: the concept of Rationality, The Nature of Environments, The structure of Agents, How the components of agent programs work.

Unit-2 (Problems Solving, Search and Control Strategies)
Solving Problems by Searching, Study and analysis of various searching algorithms. Implementation of Depth-first search, Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bi-directional search Informed (Heuristic) Search Strategies: Greedy best-first search A* search: Minimizing the total estimated solution cost, Conditions for optimality: Admissibility and consistency, Optimality of A*, Memory-bounded heuristic search, Heuristic Functions, Generating admissible heuristics from sub problems: Pattern databases, Learning heuristics from experience. Beyond Classical Search: Local Search Algorithms and Optimization Problems: Hillclimbing search Simulated annealing, Local beam search, Genetic algorithms, Local Search in Continuous Spaces, Searching with Non-deterministic Actions: AND-OR search trees, Searching with Partial Observations. Adversarial Search and Constraint Satisfaction Problems, Study of min-max algorithm Adversarial Search: Games, Optimal Decisions in Games, The mini-max algorithm, Optimal decisions in multiplayer games, Alpha--Beta Pruning, Move ordering , Imperfect Real-Time Decisions, Evaluation functions, Cutting off search, Forward pruning, Search versus lookup, Stochastic Games, Evaluation functions for games of chance, Partially Observable Games Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Variations on the CSP formalism, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, Alpha-beta pruning and CSP, Implementation aspects of minimax algorithm and CSP.

Unit- 3 (Knowledge Representations Issues, Predicate Logic, Rules)
Knowledge representation, KR using predicate logic, KR using rules. Reasoning System - Symbolic, Statistical: Reasoning, Symbolic reasoning, Statistical reasoning.

Unit-4 (Quantifying Uncertainty, Learning Systems)
Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, Other Approaches to Uncertain Reasoning, Rule-based methods for uncertain reasoning, Representing vagueness: Fuzzy sets and fuzzy logic, Study of fuzzy logic and Decision trees, Implementation aspects of Decision trees. Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, The decision tree representation, Expressiveness of decision trees, inducing decision trees from examples.

Unit-5 (Expert Systems)
Introduction, Knowledge acquisition, Knowledge base, working memory, Inference engine, Expert system shells, Explanation, Application of expert systems. Fundamentals of Neural Networks: Introduction and research history, Model of artificial neuron, Characteristics of neural networks, learning methods in neural networks, Singlelayer neural network system, Applications of neural networks. Fundamentals of Genetic Algorithms: Introduction, Encoding, Operators of genetic algorithm, Basic genetic algorithm.

Text Books
1. Rich, Elaine Knight, Kevin, Artificial Intelligence, Tata McGraw Hill.
2. Luger, George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education.

References
1. Nilsson, Nils J, Artificial Intelligence, Morgan Kaufmann.
2. Russell, Stuart J. Norvig, Peter, AI: A Modern Approach, Pearson Education.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Image Processing
Course Code:BCA601C
L-T-P Scheme: 3-1-0 **Course Credits: 4**

Introduction:

Signal processing is a discipline that deals with analysis and processing of analog and digital signals.It deals with storing , filtering , and other operations on signals. These signals include transmission signals , sound or voice signals , image signals , and other signals e.t.c.
Out of all these signals , the field that deals with the type of signals for which the input is an image and the output is also an image is done in image processing. As it name suggests, it deals with the processing on images.
It can be further divided into analog image processing and digital image processing.

Objectives:

Digital image processing deals with manipulation of digital images through a digital computer. It is a subfield of signals and systems but focus particularly on images. DIP focuses on developing a computer system that is able to perform processing on an image. The input of that system is a digital image and the system process that image using efficient algorithms, and gives an image as an output.

Learning Outcomes:

Students will be able to apply various image processing concepts and models to input images or input signals for various purposes. For example :image compression, image de-noising, image enhancement, edge detection and sharpening etc.

Application :

- Remote Sensing picture processing :
  - Tracking of Earth Resources
  - Weather Forecasting
  - Geographical Mapping
  - Identifying different areas like – Water Body
  - area, Forest Area, Hilly area etc.
- Image Transmission & Storage
  - Image Compression technique is applied

- Medical applications :
  - X-Ray, Ultra sound, etc.
- Defence :
  - Tracking missiles, vehicles etc.
- Industrial machine vision
  - we can inspect different objects

Course Contents:

Unit 1:**Introduction**

Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing – Image Acquisition, Storage, Processing, Communication, Display.

Unit 2: Digital Image Formation
A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

Unit 3:Mathematical Preliminaries
Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform

Unit 4:Image Enhancement
Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

Unit 5:Image Restoration
Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation

Unit 6 :Image Segmentation
Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

Text Books

1. Digital Image Processing, Gonzalves,Pearson
2. Digital Image Processing, Jahne, Springer India
3.Digital Image Processing &Analysis,Chanda&Majumder,PHI
4.Fundamentals of Digital Image Processing, Jain, PHI
5.Image Processing, Analysis & Machine Vision, Sonka, VIKAS
6. Getting Started with GIS- Clarke Keith. C; PE.
7. Concepts & Techniques of GIS - Lo C.P, Albert, Yeung K.W- PHI.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Software Engineering
Course Code: BCA602A
L-T Scheme: 3-1 **Course Credits: 3**

Introduction:

To review and understand the software Process, software engineering models, Software engineering Practice, data flow diagrams, requirement engineering, object-orientation, understand analysis modeling, design engineering and architectural design, User interface Design and software testing strategies, learn ethical and social implications of computing and exposure to Professional software development tools and techniques.

Appreciate understanding the critical issues involved in software development and accordingly develop analysis and design strategies for tackling the core problems across various industry domains. This would be imparted through hands on exercises and case studies on some real-life and popular software engineering tools and technologies involving databases, CASE Tools, web servers and other web related tools and technologies (for a N-tier architecture) like Eclipse, Rational Rose, C++ / Java etc. through an Enterprise wide software project implementation in a specific domain area

In addition, provided that the student has reached an acceptable standard in the assessments and examinations, the student may then undertake a dissertation / industry project as part of his summer training module. Work on a dissertation / industry project for this course will normally involve an in-depth study in the area of distributed information systems and computing (e.g., a state-of-the-art review together with appropriate software development) and provides the student with an excellent opportunity to demonstrate expertise in this area to future employers or as a basis for future MS/PhD study.

Objectives:

1. Case Study based on Software life cycle.
2. To develop, implement, and demonstrate the learning through a project that meet stated specifications.
3. You will learn User Interface Design.
4. To understand Software Cost Estimation and web engineering.

Learning Outcomes:

Knowledge:

1. You will broaden your knowledge of Software Process Models.
2. You will become aware of the Software Product.
3. You will increase your proficiency in Software Project Management.
4. You will gain practical experience in Requirements Engineering.
5. You will gain practical experience in UML tools.
6. You will acquire the background of Software Architecture.
7. to understand and be able to explain Software Metrics and Software Reliability.
8. You will learn concepts associated with Software Construction.
9. You will learn about Software Verification **Application:**

Course Contents:

Unit 1: Software Engineering - Objectives, Definitions ,Software Process models - Waterfall Model , Prototype model, RAD, Evolutionary Models ,Incremental, Spiral.

Software Project Planning - Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model.

Unit 2: Structured Analysis, Context diagram and DFD, Physical and Logical DFDs ,Data Modelling, ER diagrams, Software Requirements Specification

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Unit 3: Design Aspects,Top-Down And Bottom-Up design; Decision tree, decision table and structured English, Structure chart, Transform analysis Functional vs. Object- Oriented approach.
Unit 4: Unified Modelling Language, Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, and implementation diagram.
Unit 5: Coding & Documentation – Structured Programming, Modular Programming, Module Relationship- Coupling, Cohesion, OO Programming, Information Hiding, Reuse, System Documentation.
Testing – Levels of Testing, Integration Testing, System Testing.
Software Quality, Quality Assurance, Software Maintenance, Software Configuration Management, Software Architecture, Computer Aided Software Engineering (CASE) tool.

Text Books

1. .Software Engineering- Rajib Mall (PHI)
2. Software Engineering- Pankaj Jalote (Wiley-India)

References

1. Software Engineering : A practitioner's approach– Pressman(TMH)
2. Software Engineering- Pankaj Jalote (Wiley-India)
3 .Software Engineering- Rajib Mall (PHI)
4. Software Engineering –Agarwal and Agarwal (PHI)

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Object Oriented Programming with Java
Course Code: BCA602B
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course presents a conceptual and practical introduction to imperative and object oriented programming, exemplified by Java. As well as providing grounding in the use of Java, the course will cover general principles of programming in imperative and object oriented frameworks. The course should enable you to develop programs that support experimentation, simulation and exploration in other parts of the computer science curriculum (e.g. the capacity to implement, test and observe a particular algorithm).

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:

At the conclusion of the course, following learning objectives are expected to be achieved:

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
2. Analyze and decompose problem specifications from Object Oriented Perspectives and represent the solution, using UML notation.
3. Explain the benefits of object oriented design and the types of systems in which it is an appropriate methodology.
4. Apply an object-oriented approach to developing applications of varying complexities.
5. Augment a class definition using constructors, destructors, member functions, helper functions and custom input/output operators to add functionality to a programming solution.
6. Manage an object's resources using dynamic memory allocation and de-allocation to access data stored outside the object's memory.
7. Read from and write to files using objects from the standard input output library and custom file operators for future restoration.
8. Model specialization using single inheritance and abstract base classes to minimize code duplication.
9. Model polymorphic behavior using coercion, overloading, virtual functions and function templates to amplify reusability of code

Application:

1. The lab work and homework portions of the course are intended to help you apply your understanding.
2. Basic programming techniques.
3. Design object oriented solutions for small systems involving multiple objects.
4. Apply good programming style and understand the impact of style on developing and maintaining programs.
5. Be able to justify programming style choices.
6. Explain the steps in creating an executable program for a computer, including the intermediate representations and their purpose.
7. Trace the execution of program code to debug an application

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Course Description

Course Contents:

Unit 1: Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Unit 2: Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism.

Unit 3: Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Unit 4: Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Unit 5: Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Unit 6: Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Text Books

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – , Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata Mcgraw Hill Education Private , 7th Ed).

References

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India.
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill.
3. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Advanced DBMS
Course Code: BCA602C
L-T Scheme: 3-1 **Course Credits: 4**

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 (Post-conditions)
Knowledge objectives:

- Ability to build normalized databases.
- Knowledge of storage and indexing, disks and files
- Familiarity with SQL, embedded SQL and PLSQL
- Familiarity with tree structured indexing
- Understanding of transaction processing and evaluating relational operators
- Ability to handle recovery and concurrency issues and typical relational query optimizer
- Familiarity with physical database design and tuning.

Outcomes:

- Develop the ability to design, implement and manipulate databases.
- Introduce students to build tree structured indexing.
- Apply DBMS concepts to recovery and concurrency issues and typical relational query optimizer.

Course Contents:

Unit 1: OVERVIEW OF STORAGE AND INDEXING, DISKS AND FILES: Data on external storage; File. Organizations and indexing; Index data structures; Comparison of file organizations; Indexes and Performance tuning. Memory hierarchy; RAID; Disk space management; Buffer manager; Files ofrecords; Page formats and record formats.

Unit 2: TREE STRUCTURED INDEXING: Intuition for tree indexes; Indexed sequential access method; B+ trees,Search, Insert, Delete, Duplicates, B+ trees in practice.

Unit 3: HASH-BASED INDEXING: Static hashing; Extendible hashing, Linear hashing, comparisons.

Unit 4: OVERVIEW OF QUERY EVALUATION, EXTERNAL SORTING: The system catalog; Introduction tooperator evaluation; Algorithms for relational operations; Introduction to query optimization;Alternative plans: A motivating example; what a typical optimizer does. When does a DBMS sort data? Asimple two-way merge sort; External merge sort

Unit 5: EVALUATING RELATIONAL OPERATORS: The Selection operation; General selection conditions; TheProjection operation; The Join operation; The Set operations; Aggregate operations; The impact ofbufferingConcurrency 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: A TYPICAL RELATIONAL QUERY OPTIMIZER: Translating SQL queries in to Relational Algebra; Estimatingthe cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested subqueries;Other approaches to query optimization.

Unit 7:PHYSICAL DATABASE DESIGN AND TUNING: Introduction; Guidelines for index selection, examples;Clustering and indexing; Indexes that enable index-only plans; Tools to assist in index selection;Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries andviews; Impact of concurrency; DBMS benchmarking.

Unit 8:MORE RECENT APPLICATIONS: Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

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: Major Project **Course Code: BCA593**
L-T –P Scheme: 9P **Course Credits: 6**

Project: an activity where the participants have some degree of *choice* in the outcome. The result is complete and functional, that is, it has a beginning, middle and end. Usually, it spans multiple lab periods and requires work outside scheduled lab periods. Since there are choices in implementation, *design* is inherently a component of a project. A project is inherently different from an *analysis* or *exercise*, in which the solution has a predictable form. Projects span a wide variety of possibilities: design and build, identify a system, do a forensic analysis, evaluate a product or assess some environmental situation.

Program Objective 1
Graduates shall make their way to the society with proper scientific and technical knowledge in mechanical engineering.

Program Objective 2
Graduates shall work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis.

Program Objective 3
Graduates shall adapt to the rapidly changing environment in the areas of mechanical engineering and scale new heights in their profession through lifelong learning.

Program Objective 4
Graduates shall excel in career by their ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

Program Outcomes:

1. Ability to apply knowledge of mathematics, science and mechanical engineering fundamentals for solving problems.
2. Ability to Identify, formulate and analyze mechanical engineering problems arriving at meaningful conclusions involving mathematical inferences.
3. Ability to design and develop mechanical components and processes to meet desired needs considering public health, safety, cultural, social, and environmental aspects.
4. Ability to understand and investigate complex mechanical engineering problems experimentally.
5. Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.
6. Ability to understand the effect of mechanical engineering solutions on legal, cultural, social, public health and safety aspects./li>

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7. Ability to develop sustainable solutions and understand their impact on society and environment.
8. Ability to apply ethical principles to engineering practices and professional responsibilities.
9. Ability to function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10. Ability to comprehend, design documentation, write effective reports, make effective presentations to the engineering community and society at large.
11. Ability to apply knowledge of engineering and management principles to lead teams and manage projects in multidisciplinary environments.
12. Ability to engage in independent and life-long learning in the broad context of technological changes and advancements.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Seminar on Industrial Training **Course Code: BCA694**
L-T –P Scheme: 0-0-3 **Course Credits: 2**

Course Description & Objectives:

1. **Understand** the history of medical research and bioethics related to the HeLa cells. 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 of****self, relationships****, and* ***diverse global perspectives****.*

6. **ractice 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****.*

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Grand Viva **Course Code: BCA695**
L-T –P Scheme: 0P **Course Credits: 4**

Aims and Objectives

1. To compare the traditional viva examination (TVE) with OSVE (Objective Structured Viva Examination).

2. To obtain the students' opinion regarding OSVE as an assessment tool.

3. A suggestion to include OSVE as a part of university examination.

Materials and Methods

The study was carried out in November 2012, at K.J. Somaiya Medical College, in the department of Anatomy. 50 students were exposed to different stations of viva as well as OSVE. A comparison was made of the student's performance and a feedback was taken from the students regarding the same.

As the OSVE was being conducted for the first time, the students were notified in advance regarding the plan for conducting the part ending practical assessment – by both the TVE and OSVE. The OSVE was planned for 20 marks, viva voce of 20 marks.

Purpose and Format of the Viva Voce Examination

Literally, "viva voce" means by or with the living voice - i.e., by word of mouth as opposed to writing. So the viva examination is where you will give a verbal defence of your thesis.

Put simply, you should think of it as a verbal counterpart to your written thesis. Your thesis demonstrates your skill at presenting your research in writing. In the viva examination, you will demonstrate your ability to participate in academic discussion with research colleagues.

Purpose of the Exam

The purpose of the viva examination is to:

- demonstrate that the thesis is your own work
- confirm that you understand what you have written and can defend it verbally
- investigate your awareness of where your original work sits in relation to the wider research field
- establish whether the thesis is of sufficiently high standard to merit the award of the degree for which it is submitted

- allow you to clarify and develop the written thesis in response to the examiners' questions

The Examiners and Exam Chair

You will normally have two examiners:

- an internal examiner who will be a member of academic staff of the University, usually from your School/Department but not one of your supervisors
- an external examiner who will normally be a member of academic staff of another institution or occasionally a professional in another field with expertise in your area of research (candidates who are also members of University staff will normally have two external examiners in place of an internal and an external examiner)

Your supervisor should let you know who your examiners will be as it is important that you ensure you are familiar with their work and any particular approach that they may take when examining your thesis.

In some cases there may also be a Chair person for the examination. A Chair is appointed if the Graduate Dean or either of the examiners feels this is appropriate, for example where the examining team has relatively little experience of examining UK research degrees. The Chair is there to ensure the examination is conducted in line with University regulations and is not there to examine your thesis. If there is a Chair person, it will usually be a senior member of the academic staff of your School/Department.

Normally no one else is present in the exam.

Exam Venue and Arrangements

Your internal examiner is responsible for arranging your viva exam and they will contact you with the relevant details - date, time, venue, etc.

Usually the viva exam will take place in your School/Department, though occasionally another University location may be used. If you are unsure where you need to go, make sure you check this before the day of your exam.

If you returned your Notice of Intention to Submit Your Thesis three months before your submission date, your viva exam should normally take place quite soon after submission. Almost

all viva exams take place within three months of thesis submission and in many cases it is within one month.

Format of the Exam

All viva examinations are different, so it is not possible to describe exactly what will happen - but there are general points which can be made which may be helpful, and you should have the opportunity before your examination to discuss what will happen with your supervisor or to attend the University's pre-viva examination workshop.

The purpose of the viva is to establish that your work is of a sufficiently high standard to merit the award of the degree for which it is submitted. In order to be awarded a research degree, the thesis should demonstrate an original contribution to knowledge and contain work which is deemed worthy of publication.

In order to do this, examiners may:

- ask you to justify your arguments
- ask you to justify not only things which you have included in your thesis but also things which you may have left out
- ask you questions about the wider research context in which the work has been undertaken
- argue certain points with you
- expect you to discuss any developments which may flow from your work in the future

Inevitably, your thesis will have strengths and weaknesses and the examiners will want to discuss these. It is considered a positive thing, indeed an essential thing, that you can discuss both the strengths and the weaknesses. You can think of the weaknesses as an opportunity to demonstrate your skill at critical appraisal.

Remember that examiners seek to find and discuss weaknesses in all theses - you should not interpret criticism as an indication that the examination will not end successfully.