SACRED HEART COLLEGE (AUTONOMOUS)

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Ready for
Every Good Work

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987
Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

I. Scheme of courses

Sem	Code	Subject Name	L	T	TCP	P	IM	SM	TM	CD
I	MCA160T	Enterprise Applications with JAVA	4	1			50	50	100	4
	MCA161T	Scripting Technology	3	1			50	50	100	3
	MCA162T	Optimization Techniques	3	1			50	50	100	4
	MCA163T	Software Testing and Quality Assurance	4		1		50	50	100	4
	MCA164I	Pure Practical: Open Source Database Management System				4	100		100	4
	MCA165P	Practical JAVA				4	50	50	100	3
	MCA166P	Practical : Scripting Technology				4	50	50	100	3
			14	3	1	12	400	300	700	25
II	MCA260T	Enterprise Applications with .Net	4				50	50	100	4
	MCA261T	Computer Graphics	4	1			50	50	100	4
	MCA262T	Design and Analysis of Algorithms	3	1			50	50	100	3
	MCA263#	Elective I	3				50	50	100	3
	MCA264I	Pure Practical : Android Application Development				4	100		100	3
	MCA265P	Practical : .Net				4	50	50	100	3
	MCA266P	Practical: Computer Graphics				4	50	50	100	3
	VE804	Human Rights in India	2				100		100	1
			16	2	0	12	450	350	800	24
III	MCA360T	Python Programming	4				50	50	100	4
	MCA361T	Blockchain Technology	3	1			50	50	100	4
	MCA362T	Open Source Frameworks	3		1		50	50	100	4
	MCA363#	Elective II	3				50	50	100	3
	MCA364#	Elective III	3				50	50	100	3
	MCA365P	Practical : Python				6	50	50	100	3
	MCA366J	Software Project I				6	50	50	100	4
			16	1	1	12	350	350	700	25
IV	MCA466#	Elective IV	3				50	50	100	3
	MCA467#	Elective V	3				50	50	100	3
	MCA468J	Software Project II				24	50	50	100	10
			6	0	0	24	150	150	300	16
Total Credits										**90**

List of Elective Subjects

(Conducted in 2nd , 3rd and 4th Semesters, Students has to choose from the below course)

Semester	Course Code	Elective I
II	MCA263A	Artificial Intelligence
	MCA263B	Internet of Things
	MCA263C	Research Domain I
		Elective II
III	MCA363A	Cloud Computing
	MCA363B	Social Network Analysis
	MCA363C	Research Domain II
		Elective III
	MCA364A	Enterprise Resource Planning
	MCA364B	Big Data
		Elective IV
IV	MCA466A	Data Analytics with R Programming
	MCA466B	Data and Information Security
		Elective V
	MCA467A	Data Mining Techniques
	MCA467B	Game Programming

CODING SCHEME

MCA	X	X	X	X
Programme Code	Semester Number 1-4	Curriculum Revision Number 0-9	Course Serial Number 0-9	Course Type*

Course Type: T–Theory, P–Practical, J–Project, A to E – Electives, I – Internal Papers, S – Skill Papers.

ADDITIONAL COURSES

a) Life and Employability Skill Courses

Semester	Course Code	Course Title	Credits
I		Soft Skills	2
II		Technical Aptitude	2
III		Quantitative Aptitude	2

Note: *Life and Employability skill courses are organized by the Placement cell.*

b) Certificate Courses

Semester	Course Title	Credits
I	Web Authoring Tools	2
II	Natural Language Processing	2
III	Smart Device Technologies	2

Note: These certificate courses are intended to be conducted through training and placement consultancies of high repute and each course will be conducted for a minimum period of 30 conduct hours including theory and practicals. The concept behind these certificate courses is to enable the students to craft themselves employable and avail placement. These courses need not require an end semester examination. The cost incurring to conduct these certificate courses will be borne by the students. The list of certificate courses are listed below, however can be considered for including new courses and revising the content of the courses according to the industry requirements which varies from time to time. The course can be conducted during the semesters or during the summer/winter vacation.

I SEMESTER

Introduction

This course will enable you to build desktop application using Swing components. Provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business. This course will cover web technologies in Java and Struts 2 framework.

Prerequisite

Class and Objects – Inheritance – Interface – Package – Exception Handling – Multi Threading – I/O Streams

Course Outcomes

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

CO. No.	CO- Statement	Cognitive Level
CO 1	Discover and Apply various components and technologies used in Java platform	K1,K3
CO 2	Describe, Understand and adapt the basics of JSTL tags and EJB.	K1,K2,K6
CO 3	Apply AWT and Swing components to design GUI	K3,K6
CO 4	Examine and develop Client-Server programs using Socket, RMI and Servlet.	K4,K6
CO 5	Distinguish and Choose the Struts 2 framework for building Java EE applications.	K2,K5
CO 6	Device and Construct a well-structured MVC web application using Servlet and JSP.	K4, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
										Mean Overall Score	2.8
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment

- Application development using Swing components with JDBC.
- Establish client server applications using RMI and Servlet
- Design application using MVC pattern in JSP
- Application development using Struts 2 with JDBC

Course Content

1. ADVANCED JAVA

Java Collections: Collection Interface, List, Set, ArrayList, LinkedList, HashSet, Map, HashMap – Applet: Life Cycle, Applet Class, Execution of a Simple Applet – AWT : Events, Listeners, UI Component Classes, Layout, Windows and Frames, Menus, Dialogs, Mouse Events and Listeners- Swing – Swing Components, Swing with JDBC.

2. SOCKET, OVERVIEW OF J2EE, RMI AND SERVLET

Sockets: Ports, TCP, Server Socket Class with examples, UDP approach with examples – RMI: Introduction, Remote Interface, RMI Server Package, Naming Class, RMI Security Manager Class, Exception, Steps to create RMI application, Example Programs- Servlet: Servlet Basics, Handling the Client Request, Servlet with JDBC- Handling Cookies - Session Tracking.

3. JAVA SERVER PAGES

Overview of JSP Technology - JSP Scripting Elements - The JSP page Directive - Including Files and Applets – Java Beans - Integrating Servlets and JSP using MVC Architecture, Program using JSP, Servlet, MVC with JDBC.

4. JSTL, ENTERPRISE JAVA BEAN

JSTL Tags : Core Tags, SQL Tags – Enterprise Java Bean : Introduction to Enterprise Beans: Session Bean, Entity Bean, Message driven Bean, clients access with interfaces, life cycle of enterprise Bean, Creation of Enterprise Bean with example programs.

5. STRUTS 2.0

Struts 2 Framework - Declarative architecture - Simple Struts 2 program - Struts 2 actions-
Struts tags-Exploring the validation framework– Internationalization - Advanced action using JDBC connection.

TEXT

UNIT 1, 2: Muthu C, "Programming with Java", 2nd Edition, McGraw-Hill Education, 2010.
UNIT 3: Marty Hall, Larry Brown,"Core Servlets and Java Server Pages", 2nd Edition, Pearson Education, 2004.
UNIT 4: Stephanie Bodoff etl, "The J2EETM Tutorial", Pearson Education, 2005.
UNIT 5: Donald Brown, Chad Michael Davis, Scott Stanlick, "Struts 2 in Action", 2008.

WEB REFERENCE

www.roseindia.net, www.javapassion.com, www.r4r.co.in,   www.java2.com, www.javatutorial.com

Course Designer Prof. S. Anthony Philomen Raj

Introduction

Scripting Technology is a programming language for a runtime system that automates the execution of tasks that would otherwise be performed individually by a human operator. They are usually interpreted at runtime rather than compiled. Scripting languages aim to reduce the workload for the programmer. To do so, these languages give the programmer a range of tools. They include complex data structures like strings, lists, fields, and objects. There are many scripting languages used by web developers at present, jQuery and Java Script are most widely used scripting languages providing cross platform support and are open source tools.

This course is based on the development of web-based applications and to gain knowledge about the scripting technology and various formats and standards. The course aims to teach the mark-up languages HTML, CSS and web standards for formatting and transforming web content, interactive graphics and multimedia content on the web.

Prerequisite
Knowledge in HTML and CSS

Course Outcomes
At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Learn and apply the basic HTML Tags.	K1,K3
CO2	Build and design a web page with the help of basic web components.	K3,K6
CO3	Classify, Choose and Build jQuery and JavaScript applications.	K2,K3,K6
CO4	Differentiate and Construct client and server side Scripting	K2,K3
CO5	Draft and Design a webpage using CSS.	K5,K6
CO6	Devise and Create sample static webpages	K4, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	3	3	1	2	2.3
CO2	3	3	2	3	2	3	3	2	1	2	2.4
CO3	3	2	2	2	2	3	2	2	1	2	2.1
CO4	3	3	2	3	2	3	1	1	1	2	2.1
CO5	3	3	3	2	2	3	1	1	1	2	2.1
CO6	3	2	2	3	2	3	2	1	1	2	2.1
										Mean Overall Score	2.2
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	15
Apply	10	10	30
Analyze	10	10	15
Evaluate	5	5	10
Create	5	5	10

Participatory Assessment

- Quiz on basics of HTML, CSS, and jQuery.
- Develop static webpages.
- Create School webpage using CSS.
- Creating Educational Blog with relevant course online course content
    - (HTML tags, CSS , Java Scripting and jQuery)

Course Content

1. WEB DESIGN – GETTING STARTED
Working of Web - The Internet Versus the Web.. - Web Page Addresses - Sticking with the Standards -HTML Markup for Structure - Creating simple page- A Web Page, Step by Step- Marking up text- Paragraphs - Headings. Lists - Organizing Page Content

2. HTML MARKUP FOR STRUCTURE
Adding Links - Pages on the Web - Mail Links- Adding Images - The img Element- A Window in a Window- Table Markup - Minimal Table Structure- Spanning Cells- Wrapping Up Tables- Forms- The form Element- Variables and Content- Form Layout and Design - HTML5-   XHTML 2.. Video and Audio.

3. CASCADING STYLE SHEETS
CSS - Benefits of CSS -Formatting text - Colours and Background - Padding, Borders and Margins - Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation.

4. CLIENT SIDE SCRIPTING
Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

5. jQUERY
Expanding Your Interface- jQuery UI - Adding Messages, Dialog Boxes- Tooltips- Pannel- Menus to a Page-Forms Revisited. -Stylish Dates, Menus, Buttons, Radio Buttons and Checkboxes- UI Form Widget Tutorial -Customizing the Look of jQuery UI- Theme Roller-New them -overriding styles. Interaction and Efforts - Draggable Widget - Drag-and-Drop Tutorial - Sorting Page Items - jQuery UI Effects.

TEXT
1. Jennifer Niederst Robbins, "Learning Web Design", Forth Edition, O'Reilly, 2012.
    UNIT 1: Ch: 2 – 5
    UNIT 2: Ch: 6 – 10
    UNIT 3: Ch: 11 – 17
1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2011.
    UNIT 4: Ch: 4

2. David Sawyer McFarland ".JavaScript & jQuery: The Missing Manual", O'Reilly Media, 2014.
    UNIT 5: Ch: 9-12

REFERENCE

1. Paul Deitel, Harvey Deitel & Abbey Deitel, "Internet and World Wide Web: How to Program", Fifth Edition, Pearson Education, 2018.

2. "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Second Edition, DT Editorial Services, Dreamtech Press, 2016.

3. Ryan Benedetti & Ronan Cranley, "Head First jQuery", O'Reilly Media, 2011.

Course Designer   Prof. R.Veeraragavan

Introduction

In today's world, software is essential. It automates all of our tasks, allowing us to be free of manual labour. A thorough verification and validation procedure is essential for delivering reliable software. The objective of the course is to make the learners to be aware about the importance of the software testing during software development. Its aim is to enable the learners to learn and explore a range of software testing methods and give them confidence that a trustworthy, safe, and secure software product will delivered to the client though testing and quality assurance process.

Prerequisite

Basics of Software Engineering (SDLC)

Course Outcomes

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

CO. No.	CO - Statement	Cognitive Level
CO 1	Observe and Explain the significance of software testing and quality assurance	K1,K2
CO 2	Discuss and Elicit the basics of software testing, including objectives, process, criteria, strategies, and methodologies.	K1, K2
CO 3	Apply white box testing approach and Design the test cases.	K3,K6
CO 4	Devise and Design test cases from the given requirements using Black box testing techniques	K4,K6
CO 5	Observe, Recognize and do case studies on the need for System and user acceptance testing.	K2, K4,K6
CO 6	Discuss and Elicit importance of non-functional testing and the types of non-functional testing.	K2,K3

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	1	3	1	3	3	2	2	1	2.2
2	3	2	1	3	1	3	2	2	2	1	2
3	3	2	1	2	1	3	2	2	1	1	1.8
4	3	2	1	2	1	3	3	2	1	1	1.9
5	3	2	1	2	1	3	2	2	2	1	1.9
6	3	3	1	2	1	3	2	2	1	1	1.9
										Mean Overall Score	2
										Result	Medium

Assessment Pattern

| Bloom's Category | CA Tests (Marks Allotment) | | Term End Exam (100) |
	I CA (50)	II CA (50)	Marks Allotment
Remember	05	05	10
Understand	05	05	10
Apply	20	20	30
Analyze	10	10	30
Evaluate	05	05	10
Create	05	05	10

Participatory Assessment

- Writing Test Scenario
- Creating Test Cases
    - Boundary Value Analysis
    - Equivalence Class Partitioning
- Preparing Test Plan
- Testing Tools
    - Selenium IDE
    - JUNIT

Course Content

1. INTRODUCTION TO TESTING AN QUALITY

Principles of Testing - Software Development Lifecycle Models: – Phases of software project – Quality, Quality Assurance and Quality Control – Testing verification and validation-Process model to represent different phases – life cycle models - Spiral or Iterative model - The V Model - Modified V Model – Comparison of Various life cycle models.

2. WHITE BOX TESTING

Software Testing Types: White box testing – What is white box testing – Static testing – Structural testing – Challenges in White box testing.

3. BLACK BOX TESTING

Black box testing - What is black box testing – Why black box testing – When to do black box testing – How to do black box testing - Integration testing - What is integration testing integration testing as a type of testing - integration testing as a phase of testing – Scenario testing.

4. SYSTEM AND ACCEPTANCE TESTING

System and acceptance testing – System testing overview – Functional Versus Non Functional testing – Functional System testing – Non Functional testing - Acceptance testing – Summary of Testing Phases.

5. NON – FUNCTIONAL TESTING

Performance testing – Factors Governing Performance testing - Methodology for Performance testing – Tools for Performance testing – Process for Performance testing - Regressing testing – What is regression testing – Types of regression testing - When to do regression testing – How to do regression testing.

TEXT

Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing Principle and Practices", Sixth Impression, 2008, ISBN: 978 – 81 – 7758 – 121 – 8.

REFERENCES

1. Illene Burnstien, "Practical Software Testing", First Edition, Springer International Edition, 2004, ISBN: 81-8128-0 89-X.

2. William E Perry, "Effective Methods for Software Testing", Second Edition, John Wiley & Sons, 2005, ISBN: 9971–51–345–5.

3. Sandeep Desai and Abhishek Srivastava, "Software Testing a Practical Approach", PHI Learning, 2012, ISBN: 978-81-2034-534-8.

4. S.A. Kelkar, "Software Quality and Testing - A Concise Study", PHI Learning Private Limited, 2012, ISBN: 978-81-203-4628-4.

5. Dorothy Graham, Erik van Veenendaal, Isabel Evans and Rex Black, "Foundations of Software Testing ISTQB Certification", Cengage Learning India Private Limited, 2007, ISBN-13: 978-81-315-0218-1.

6. Jason Germbi, "Developing Secure Software", Cengage Learning India Private Limited, 2008, ISBN 13: 978-81-315-0888-6.

SOFTWARE TESTING AND QUALITY ASSURANCE (TCP)

1. Writing Test Scenario

2. Creating Test Cases

    i. Boundary Value Analysis

    ii. Equivalence Class Partitioning

3. Preparing Test Plan

4. Testing Tools

    i. Selenium IDE

    ii. JUNIT

Course Designer: Prof. A. John Martin.

Introduction

This course makes the learner to self-study along with the tutor and to construct simple and moderately advanced database queries using Structured Query Language (SQL), PL/SQL, Cursors, and Triggers.

Prerequisite
- SQL Data Types, SQL Constraints
- SQL Statements (DDL, DML, DRL, DCL and TCL)
- Database Normalization
- Database Users Privileges, Roles and Rights

Course Outcomes
At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Discover the various SQL, PL/SQL and DBA statements.	K1
CO 2	Understand the basic concepts of relational database management system and design structure models.	K2
CO 3	Apply the normalization procedure to design a suitable structure for a given problem situation.	K3
CO 4	Extract, formulate and execute different SQL queries to interact with the database.	K4, K5
CO 5	Implement processing logic in the form of PL/SQL blocks routines like functions, procedures, cursors and triggers.	K5
CO 6	Understand the role play of the database administrator and	K2, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
Mean Overall Score											2.8
Result											High

Assessment Pattern

Bloom's Category	Continuous Assessment Marks Allotment (50)	Term End Exam (50)
Remember		
Understand	10	10
Apply	10	10
Analyze	10	10
Evaluate	10	10
Create	10	10

Participatory Assessment

- Constructing Entity Relationship diagram for the specified problems

- Handling simple SQL queries on the constructed E-R diagram.

- Handling sub queries and Aggregate functions, String functions, Math functions, etc..,

- Constructing PL/SQL block and handling Cursors and Triggers

Course Content

LIST OF PROGRAMS

1. Creating and Managing Tables
    a) Constraints

2. SQL Statements – 1
    a) Basic SQL SELECT Statements
    b) Restricting and Sorting Data
    c) Single-Row Functions

3. SQL Statements – 2
    a) Displaying Data from Multiple Tables
    b) Aggregating Data Using Group Functions
    c) Subqueries

4. Manipulating Data
    a) INSERT statement
    b) DELETE statement
    c) UPDATE statement

5. Creating and Managing Views
    a) Creating Views
    b) Implementing DML Statements on views

6. Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced subqueries

7. PL/SQL Basics
    a) Declaring Variables
    b) Writing Executable Statements
    c) Interacting with the Oracle Server
    d) Writing Control Structures

8. Composite data types, cursors and exceptions
    a) Working with Composite Data Types
    b) Writing Explicit Cursors
    c) Handling Exceptions

9. Procedures and Functions
    a) Creating Procedures
    b) Creating Functions
    c) Managing Subprograms
    d) Creating Packages

10. Triggers
    a) Creating Triggers
    b) Creating Triggers

11. DBA Commands
    a) Creating Database
    b) Users Creations and Privileges
    c) Grand and Revoke

REFERENCE
1. Shio Kumar Singh, "Database Systems Concepts, Designs and Applications", 2nd Edition, 2011, Dorling Kindersly (India) Pvt.Ltd.
2. Kogent Solutions, "Oracle 10g Administration in Simple Steps", First Edition, 2008, Dreamtech.

Course Designer Prof. S. Anthony Philomen Raj

1. Creation of interactive web sites - Design using HTML and authoring tools

a. basic HTML tags, different styles, links and with all Basic control elements.

2. Create a webpage with two tables. First one should have 1 row and 5 columns and the second one with 3 rows and 4 columns. The contents of the first table should be center aligned and contents of the second table should be right aligned. Each column of the first table should have separate colors and each row of the second table should have separate colors.

3. Create a framed webpage with different frames.

4. Collect of Personal Information using forms.

5. Create a web page with all types of Cascading style sheets.
   i.   Inline
   ii. Internal
   iii. External

6. Handling multimedia content in websites.

7. Client-Side Scripts for Validating Web Form Controls using DHTML.

8. Create webpage with following using jQuery.
   i.   Selectors
   ii. Events
   iii. Hide and Show
   iv. Fade
   v.   Slide
   vi. Animate

9. Generate jQuery Programs using CSS.

10. Create Custom animations with jQuery.

QUESTION PAPER PATTERN

CA Tests   **Max. Marks: 50**

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions.   (2 x 25 = 50)

- First part, shall contain questions from the exercise list.

- Second part will present an unexplored problem to be solved.

- The problem should be addressed using at least 3 technical features of the respective technology stream.

- No more than three candidates should get the same question in a batch.

End Semester Examinations   **Max. Marks: 100**

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions.   (2 x 50 = 100)

- First part, shall contain questions from the exercise list.

- Second part will present an unexplored problem to be solved.

- The problem should be addressed using at least 3 technical features of the respective technology stream.

- No more than three candidates should get the same question in a batch.

Course Designer Prof. R. Veeraragvan

MCA260T	ENTERPRISE APPICATIONS WITH .NET	4-0-0-0:100

INTRODUCTION

Enterprise application development is the approach used by organizations to support business operations, solve business problems, and manage day-to-day tasks through an integrated digital platform. These applications should be able to run across various computing platforms such as standalone, network, web based and mobile versions. .NET for enterprise application development is a setup specifically designed for run-time components with APIs and languages, compilers, and more. In addition, it works on Windows, Linux, and Mac OS with both the .NET Framework and .NET Core. The platform's vision is to support .NET applications, including JIT and other native models that can run on the desktop, Web and mobile devices.

This course aims to deliver the basics of structured programming and object oriented programming and to enable the learners to develop console and window based applications. The course is expected to enable the learners to become proficient in developing database, web and mobile applications in .Net by integrating the various components of the .NET framework.

PREREQUISITE

- Basics on Structured and Object Oriented Programming Paradigm
- Knowledge in Graphical User Interfaces
- Handling of Data Bases
- Basics of HTML and WWW
- Scripting Language

COURSE OUTCOMES

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

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Infer and Apply the basics of structured programming.	K1, K3
CO2	Use the basics of object oriented programming and design object oriented programs.	K3,K6
CO3	Device and Develop programs in structured programming model.	K4,K6
CO4	Device and Design solutions in object oriented programming paradigm.	K4,K6
CO5	Construct Develop stand-alone windows applications in the .NET framework.	K6
CO6	Construct, Device and Build applications with WPF control, styles and resources.	K3,K4,K6
CO7	Create web-based applications using ASP.NET.	K6
CO8	Build data aware standalone and web applications.	K3
CO9	Illustrate the usage and application of LINQ.	K2
CO10	Integrate solutions across console, windows and web frameworks.	K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)	Programme Specific Outcomes (PSO)	

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Scores of COs
CO1	3	3	2	3	2	3	3	3	2	2	2.6
CO2	3	3	3	3	3	2	3	3	2	2	2.7
CO3	2	3	2	3	2	3	3	2	3	2	2.5
CO4	3	3	2	3	2	3	3	3	2	2	2.6
CO5	3	3	3	3	2	3	3	3	2	2	2.7
CO6	3	2	3	2	2	3	3	3	2	2	2.5
									Mean Overall Score		2.6
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	5	5	15
Understand	10	10	15
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	10
Create	10	10	25

Participatory Assessment

- Quiz on basics of Structured Programming
- Quiz on basics of object oriented programming
- Developing a windows calculator application
- Developing a windows notepad application
- Developing a data base application with report
- Designing a asp.net application for online reservation

Course Content

1. FUNDAMENTALS OF C#
.NET Framework Architecture – C# Language– Literals, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping – Methods in C# - Handling Arrays – Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism –Interface – Operator Overloading – Delegates and Events – Managing Errors and Exceptions –Multithreading in C#.

2. WINDOWS FORMS
Introducing the Form Class – Performing Common Form Operations – Creating Message Boxes – Creating Input Boxes – Creating Dialog Boxes – Handling Events — Using the Label Control, Using the TextBox Control, Using the Button Control, Using the RadioButton Control, Using the CheckBox Control, Using the ComboBox Control, Using the ListBox Control, Using the GroupBox Control, Using the Panel Control, Using the PictureBox Control, Using the Timer Control, Using the Progress Control - Using the ToolStrip Control- Using the MenuStrip Control – Using the StatusStrip Control – Working with Dialog Boxes.

3. WINDOWS PRESENTATION FOUNDATION
Using XAML in WPF – Working with WPF Controls: Textbox, label, Button, listbox, ComboBox, radio button , Check Box, PasswordBox, TextBlock, Border, Grid, GridSplitter, Canvas, StackPanel, DataGrid, Calendar, DatePicker Controls – Working with Resources and Styles.

4. ASP.NET

Standard Controls: Introducing the WebControl Class – Using the Label Control – Using the TextBox Control – Using the Button Control – Using the ImageButton Control – Using ListBox Control – Using the RadioButton Control – Using the CheckBox Control – Using the Table Control – Using the Wizard Control – Using the Calendar Control – Using the AdRotator Control – Navigation Controls : Working with the SiteMapPathControl – Working with Menu Control – Working with TreeView Control – Validation Controls: Introducing the BaseValidator Control – Using the RequiredValidator Control – Using RangeValidator Control – Using RegularExpressionValidator Control – Using the CompareValidator Control – Using the CustomValidator Control – Using the ValidationSummary Control.

5. LINQ AND ADO.NET

LINQ: Create a Simple LINQ Query – Working with Standard Query Operators – Implementing LINQ to ADO.NET – Using Anonymous Types in Queries – Using Lambda Expressions in Queries – Exploring PLINQ – Working With ADO.NET: Introducing ADO.NET – Accessing Data in ADO.NET – Implementing Data Binding: Data Binding in Windows Forms – Data Binding in WPF – ASP.NET Database Controls: Working with ADO.NET – Introducing DataSource Controls – Working the Data-Bound Controls.

TEXT

1. E.Balagurusamy, "Programming in C#", Third Edition, McGrawHill Higher Education, New Delhi, 2010.
   UNIT 1: Chapter – 4,5,6,7,8,9,11,12,13,14,15,16,18,19

2. VikasGupta, "Comdex .NET 4.5 Programming", Dream Tech Press, New Delhi, 2014.

UNIT 1: Chapter 2
UNIT 2: C# 2012 - Chapter 2 and 3
UNIT 3: Visual Basic – Chapter 5
UNIT 4: ASP.NET 4.5 – Chapter 1, 2, 3, and 4
UNIT 5: C# - Chapter – 4, 5, 6 and ASP.NET 4.5 – Chapter 6

REFERENCE

1. Kogent Solutions, "C# 2008 Programming Black Book", Dream Tech Press, New Delhi, 2009.

2. David S.Platt, "Introducing Microsoft .Net", Prentice Hall of India, Private Limited, New Delhi, 2008.

Course Designer   Dr. A . George Louis Raja

Introduction

Algorithm design refers to scientific methodology or process applied to evolve a mathematical model in problem solving paradigm. Applied algorithm design is also called as algorithm engineering and strongly correlates with problem solving and software engineering, making this an important area of study in computer applications.

The analysis of algorithms is the determination of the computational complexity of an algorithm in terms of time and space. The scope for analysis in problem solving to decide on the best suitable solution makes it another rudimentary study in computer applications.

Prerequisite

- Basics on discrete mathematics – sets, functions, relations, recurrence relations, proof by derivation and induction – Boolean logic – variables, operators, tautology, contradiction.
- Probability theory – conditional probability, unconditional probability, baye's theory, random numbers.
- Data Structures – primitive, composite and user defined data structures, stacks, queues, linked lists, trees, graphs and heaps.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and elicit the relevance of algorithms for computational problems solving and software engineering.	K2,K3
CO 2	Observe and Apply various algorithmic approaches, techniques and methods.	K1,K3
CO 3	List, Elicit and Apply design and analysis techniques to model and solve a problem.	K1,K2,K3
CO 4	Correlate and Evaluate the efficiency of an algorithm	K4,K5
CO 5	Differentiate and Compute the time and space complexities of an algorithm.	K2, K3
CO 6	Design and Evaluate any given problem with mathematical rigor to provide a scientific solution.	K5, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	3	2	2	3	3	2	2	2	2.4
2	2	3	2	3	2	3	3	2	2	2	2.4
3	2	3	2	3	2	3	3	1	2	2	2.3
4	3	3	3	2	2	3	3	2	2	2	2.5
5	2	3	2	3	2	1	2	2	2	2	2.1
6	3	3	3	2	2	1	1	2	2	2	2.1
										Mean Overall Score	2.3
										Result	High

Assessment Pattern

| Bloom's Category | CA Tests (Marks Allotment) | | Term End Exam (100) |
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	10	20
Understand	10	10	20
Apply	10	10	20
Analyze	10	10	20
Evaluate	10	10	20
Create	-	-	-

Participatory Assessment
- Implementation of Algorithms in a Programming Language of choice
  (Merge sort, Kruskal's method, Travelling Salesperson, 4 Queens problem, Primality Testing, Shortest-path, Non deterministic searching)
- Analysis of Algorithms
  Merge sort, Knapsack problem, sum of subsets, Non deterministic   sorting
- Building Models
  Multiplication of two Matrices in Bounded Degree, Mesh, Star, Hypercube networks

Course Content

1. INTRODUCTION TO ALGORITHMS
Basics of Algorithm: Introduction – Upper Bound of Polynomial Form of Time Complexity –
Divide and Conquer: Introduction – Merge Sort - Multiplication of Two n Bit Numbers – Greedy Method: Introduction – Minimum Cost Spanning Tree – Dijikstras' single source shortest path.

2. DYNAMIC PROGRAMMING, BACKTRACKING AND BRANCH AND BOUND
Dynamic Programming: Introduction – Travelling Salesperson – 0/1 Knapsack Problem –Backtracking: Introduction – Four Queens Problem – Branch and Bound – Assignment Problem.

3. RANDOMIZED AND APPROXIMATION ALGORITHMS
Randomized Algorithm: Introduction – Primality Testing – Majority Element – Approximation Algorithms: Introduction – Job Scheduling – Bin Packing.

4. REDUCTION METHOD AND NON DETERMINISTIC ALGORITHMS
Reduction Method: Non Deterministic Algorithms – Non Deterministic Searching – Non Deterministic Sorting – Satisifiability.

5. PARALLEL ALGORITHMS
Introduction – PRAM Algorithms: List Ranking – Finding Maximum of an Array of Elements – Bounded Degree Network Algorithms: Networks – Network Algorithms – Summation on Multiprocessors.

Text and References
S.K.Basu, "Design Methods and Analysis of Algorithms", Prentice Hall of India,   New Delhi, 2008.

REFERENCES

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran,"Fundamentals of ComputerAlgorithms", Galgoti Publications Pvt.Ltd. NewDelhi, 2001.

2. Alfred Aho, John Hopcroft, Jeffrey Ullman, "The Design and Analysis of Computer Algorithms", Pearso Education, Delhi, 2003.

3. Thomas Cormen, Charles Leiserson, Ronald Rivest, "Introduction to Algorithms", Prentice Hall of India, Nev Delhi, 1998.

Course Designer   Dr. A. George Louis Raja

Introduction

This course provides a comprehensive, graduate-level introduction to artificial intelligence, emphasizing advance topics such as advanced search, reasoning and decision-making under uncertainty, and machine learning.

Prerequisite

Data Structures, Algorithms, Discrete Mathematics, Probability and Statistics.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Discover and Apply the various technologies used in Artificial Intelligence	K1,K3
CO 2	Observe and Discover the history of artificial intelligence (AI) and its foundations	K1, K2
CO 3	Observe and Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	K1,K3
CO 4	Analyse and Evaluate various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	K4.K5
CO 5	Ability to choose appropriate Knowledge based approach for problem solving.	K3,K5
CO 6	Draft, Design and create their own artificial intelligence applications for solving a real life problem	K4,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	1	2	3	3	3	2	2	2.4
2	3	3	2	1	2	3	3	3	2	2	2.4
3	3	3	2	1	2	3	3	3	2	2	2.4
4	3	3	2	2	2	3	3	3	2	2	2.5
5	3	3	2	2	2	3	3	3	2	2	2.5
6	3	3	2	2	2	3	3	3	2	2	2.5
									Mean Overall Score		2.5
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment
- Problem Solving - Propositional Logic, FOPL, Wffs and Inference Rules
- Constructing Knowledge representations
- Search Problems in knowledge representations
- Problems in Parsing Techniques and Pattern Recognition
- Problems in inductive Bias

Course Content

1. CONCEPT AND SYMBOLIC LOGIC
What is AI, Importance of AI, AI and Related Fields – Knowledge: Definition and Importance of Knowledge, Knowledge Based Systems, Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition of Knowledge – Symbolic Logic: FOPL, Syntax and Semantics for Propositional Logic, Syntax and Semantics for FOPL, Properties of Wffs, Conversion to Clausal Form, Inference Rules, Resolution principle.

2. KNOWLEDGE REPRESENTATION
Structured Knowledge: Introduction, Associative Networks, Frame Structure, Conceptual Dependencies and Scripts – OO Representation: Introduction, Overview of OO Systems, Objects, Classes, Messages, Methods, Simulation Using OOS Program – Fuzzy Logic and Natural Language Computations.

3. KNOWLEDGE ORGANIZATION AND MANIPULATION
Control Strategies: Preliminary Concepts, Uniformed or Blind Search, Informed Search, Searching And-Or Graphs, Examples of Search Problems – Matching Techniques: Introduction, Structures used in Matching, Measure for Matching, Matching Like Patterns, Fuzzy Matching Algorithms – Indexing and Retrieval Techniques.

4. EXPERT SYSTEM
Natural Language Processing: Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Sematic Analysis and Representation, Natural Language Generation, Natural Language Systems – Pattern Recognition: Recognition and Classification Process, Learning Classification Patterns – Expert System Architecture: Introduction, Rule Based System Architectures, Nonproduction System Architecture, Dealing with Uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools.

5. LEARNING BY INDUCTION
Intelligent Editors – Basic Concepts, Some Definitions, Generalization and Specialization, Inductive Bias, Example: Inductive Learner – ID3 System – LEX System – INDUCE System – Learning Structure Concepts.

TEXT

Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2nd Edition, 2015.

REFERENCE

1. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Education, 2007.

2. Stuart Russel and Peter Norvig, "AI – A Modern Approach", Second Edition, Pearson Education 2007.

3. Deepak Khemani, "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

Course Designer Prof. V. Thomas Immunuel

Introduction

Internet of Things (IoT) is a new paradigm that has changed the traditional way of living into a high tech life style (Smart city, smart homes, pollution control, energy saving, smart transportation, smart industries). IoT explore best opportunity for career oriented creators as they can learn, build and understand system on its own.

The course (IoT) describes the network of physical objects - "things" - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet and to analysis the data which are made to flow among the devices. The application of IoT in several verticals has been made opened for study (case study).

Prerequisite

- Topology connectivity, Networking Layer Models,
- Basics of TCP/IP.
- Networking devices, Configuring of devices in the network.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Acquire and use the various objects or things handled in the connectivity	K1.K3
CO 2	Learn and Practice to connect and activate the objects with procedure (domain specific).	K1,K3
CO 3	Compare and correlate the network layer model with Internet of Things layers.	K2,K4
CO 4	Observe and Apply analysis techniques on the constructed model (domain specific).	K1,K3
CO 5	Analyze and Assess IoT communication (connecting and passing data) using different architectures.	K4.K5
CO 6	Do Case study and build the Architecture and Use cases for the domain specific problems	K6, K3

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	1	2	2	3	3	1	2	2	2.2
4	3	3	1	1	2	3	3	2	2	2	2.2
5	3	3	2	2	2	3	3	2	2	2	2.4
6	2	2	2	2	2	3	3	2	2	2	2.2
									Mean Overall Score		2.3
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	10	10	30

Understand	10	10	20
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	5
Create	5	5	10

Participatory Assessment

- Various sensors, actuator and other related components are studied through videos and by witnessing physical components.
- Different networking layers of IoT are discussed among the student team.
- Developing the prototypes models on the domain specific problem using Arduino.
- The passed data are analyzed using the analytics approach.

Course Content

1. ARCHITECTURES AND MODELS

IoT Architectures – IoT Functional Stack, Sensors, and Actuators Layer, Communications Network Layer, Applications and Analytics Layer – IoT Data Management and computer Sack, Fog Computing, Edge Computing, Cloud Computing - Smart Objects, Sensor Networks.

2. CONNECTIVITY

Communication Criteria – Access Technologies – IP as IoT Network Layer – Profiles and Compliances – Application Protocols – Transport Layer – Application Transport Methods.

3. SYSTEM DEVELOPMENT

Design Methodology – Case study – Basic blocks of IoT device – Arduino – Raspberry Pi – Board, Interfaces, Setting up, Programming – Other IoT Devices.

4. DATA ANALYTICS

Data Analytics for IoT – Big Data Analytics Tool and Technology, Edge Streaming Analytics – Network Analytics.

5. IoT IN INDUSTRY

Manufacturing Industry, Architecture and Use cases - Smart Cities, Architecture and Use cases – Transportation Architecture and Use cases.

TEXT

Olivier Hersent, David Boswarthick, Omar Eloum, "The Internet of Things-Key applicaions and Protocols", Wiley Publication, 2012.

REFERENCE

1. Jan Ho'ller, VlasiosTsiatisis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand, David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsever, 2014.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things- A hands-on-approach", Universities Press, 2015.
3. Michael Miller, "The Internet of Things", Pearson Education, 2015.

Course Designer   Prof. V. Thomas Immanuel

Introduction

The course is for designing and building mobile applications using Android open-source platform. This course encourages students to build meaningful mobile applications using GUI components, Layout Manager, SQLite and various other tools.

Prerequisite

- Mobile Application Model, Frameworks and Tools.
- Multimodal and Multichannel UI, Screen Elements and Layouts, Voice XML.
- Work flow for Application Development, Java API, Plug-ins and Rule of Thumb for using DLLs.
- Android Application Architecture, Android basic Components, Storing and Retrieving Data, Packaging and Deployment.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Recognize and recall the various tools and technologies used to develop mobile applications.	K1
CO 2	Install and interact android studio and related SDK and enabling emulator or mobile device	K2
CO 3	Apply various design components in the development of mobile applications	K3
CO 4	Identify the right user interface for mobile application	K4
CO 5	Discuss the various UI components with SQLite and establish database connection.	K5
CO 6	Develop mobile applications using various tools and platforms	K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
Mean Overall Score											2.8
Result											High

Assessment Pattern

Bloom's Category	Continuous Assessment Marks Allotment (50)	Term End Exam (50)
Remember	-	-
Understand	10	10
Apply	10	10
Analyze	10	10
Evaluate	10	10
Create	10	10

Participatory Assessment

- Handling various GUI components in constructing an app using Java and XML file.
- Designing UI for the various problems using Layout managers and fixing the process logic using event listeners.
- Constructing a simple app such like Calculator, Alram Clock and GPS.
- Design and develop application using SQLite.

Course Content

LIST OF PROGRAMS

1. Develop an application that uses GUI components, Fonts, and Colours.
2. Develop an application that uses Layout Managers and Event Listeners.
3. Develop a native calculator application.
4. Develop an application that makes use of database.
5. Develop a native application that uses GPS location information.
6. Write an application that creates alarm clock.

REFERENCE

Reto Meier, "Professional Android 4 Application Development", Wiley Publication, 2012.

Course Designer   Prof. S. Anthony Philomen Raj

MCA265P   **PRACTICAL: .NET**   **0-0-0-4:100**

CONSOLE APPLICATION

1. Branching, Looping and Methods

2. Handling Arrays, Structures and Enumerations

3. Classes and Objects, Inheritance and Polymorphism, and Interface

4. Delegates and Events, Managing Errors and Exceptions, and Multithreading

WINDOWS APPLICATION

5. Message Box, Input Box and Dialog Box

6. Label, TextBox, Button, Radio Button, CheckBox, GroupBox, and Panel Controls

7. ComboBox, ListBox, Timer, Progress Controls

8. Tool Strip and Menu Strip Controls

9. Working with Dialogs

WINDOWS PRESENTATION FOUNDATION

10. Grid, Button, TextBox, PasswordBox, TextBlock, Border, GridSplitter, and Canvas

11. StackPanel, DataGrid, Calendar, and DatePicker Controls

12. Working with Resources and Styles

WEB APPLICATION

13. Label Control, TextBox Control, Button Control, and ImageButton Control

14. ListBox Control, RadioButton Control, and CheckBox Control

15. Calendar Control and AdRotator Control

16. Working with Navigation Controls

17. Working with Validation Controls

ADO.NET

18. Implementing LINQ to ADO.NET

19. Working with Windows Forms and ADO.NET

20. Working with WPF and ADO.NET

21. Working with ASP.NET and ADO.NET

Course Designer   Dr. A . George Louis Raja

MCA360T	PYTHON PROGRAMMING	4-0-0-0:100

Introduction

Python can be considered beginner-friendly, as it is a programming language that prioritizes readability, making it easier to understand and use (for novice programmers) its syntax to leap into the world of development. Python is less verbose than other programming languages, a little less wordy. Python is approachable and can be used for scripting, web scraping, and creating data sets. The code design emphasis on code readability and its syntax allows programmers to express their concepts in fewer lines of code.

The course makes to learn the scripting elements, handling various supporting methods/packages, exception handlers and different file concepts. The framework DJANGO and the database connectivity are also exposed in developing web application.

Prerequisite
- Basic knowledge in any programming language.
- Basic Database Management and Structure Query Language skills.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and practice the fundamentals of writing Python scripts and Python scripting elements.	K1,K3
CO 2	Express and Apply the concepts of file handling, exception handling and database connectivity.	K2,K3
CO 3	Apply and build the different dimensions of design and development.	K3,K6
CO 4	Devise and Design GUI applications.	K4,K6
CO 5	Draft and Create a dynamic web page using DJANGO.	K5,K6
CO 6	Devise and Develop domain based applications	K5,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	3	2	2	3	3	1	2	2	2.4
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	2	1	2	3	3	2	2	2	2.3
6	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		2.5
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	10	10	30
Understand	10	10	20
Apply	15	15	20
Analyze	5	5	10
Evaluate	5	5	10
Create	5	5	10

Participatory Assessment

- Constructing and demonstrating the program using of primitive and built-in data structures.
- Design and implement a program to solve a real world problem.
- Design and implement GUI application and how to handle exceptions and files.
- Make database connectivity in python programming language.

Course Content

1. PYTHON OBJECTS

Introduction to Python, Comparison, Comments, Operators, Variables, Classes, Modules Syntax and Style Statements, Variable Assignment, Identifiers, Basic Style Guidelines. Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types, Numbers and Strings, Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods.

2. LISTS AND DICTIONARIES

Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples Introduction to Dictionaries, Operators, Built-in Functions, Built-in Methods, Dictionary Keys, Conditionals and Loops: if statement, else Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.

3. FILES, REGULAR EXPRESSION AND EXCEPTION HANDLING

File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules. Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

4. DATABASE INTERACTION

SQL Database connection using python, creating and searching tables, Reading and storing config information on database, Programming using database connections, Python Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

5. DJANGO: WEB DEVELOPMENT WITH PYTHON

Introduction, Creating a Django Project, Working with Templates, Working with Models, Getting a Model's Data with Querysets, Working with Django Forms.

TEXT

R. NageswaraRao, "Core Python Programming", Second Edition, Dreamtech Press, 2018

REFERENCE

1. Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, "Python Programming", First Edition, Notion Press, 2020
2. Martin C. Brown, "The Complete Reference Python", Fourth Edition, McGraw Hill Education, 2018
3. Samuel Dauzon, Aidas Bendoraitis, Arun Ravindran, "Django: Web Development with Python", Packt Publishing Ltd, 2016.
4. Allen B. Downey, "Think Python", O'Reilly Media, 2016.

5. Amit Ashok Kamthane, Ashok NamdevKamthane, "Programming and Problem Solving with Python", First Edition, McGraw Hill HED, 2017.
6. SakisKasampalis, Quan Nguyen,Dr Gabriele Lanaro, "Advanced Python Programming", Ingram short title, 2019.

QUESTION PAPER PATTERN

CA Tests   **Max. Marks: 50**

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.
[Atleast four questions from each unit]   6 x 2 = 12

Section B Answer **ALL** the Questions
[Atleast three questions from each unit. Either or Type]   3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.
[Atleast one question from each unit]   2 x 10 = 20

End-Semester Examinations   **Max. Marks: 100**

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.
[Atleast two questions from each unit]   10 x 2 = 20

Section B Answer **ALL** Questions.
[Either or Type, atleast one question from each unit]   5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.
[Atleast one question from each unit]   3 x 15 = 45

Course Designer   Prof. V. Thomas Immanuel

Introduction

Blockchain is the backbone Technology of Digital CryptoCurrency BitCoin. The blockchain is a distributed database of records of all transactions or digital event that have been executed and shared among participating parties. Each transaction verified by the majority of participants of the system. One of the famous use of Blockchain is Bitcoin. The bitcoin is a cryptocurrency and is used to exchange digital assets online. Bitcoin uses cryptographic proof instead of third-party trust for two parties to execute transactions over the internet.

This course aims to deliver the basics of Blockchain technology with its architecture, outlines the security mechanisms applied in blockchains, describes the bitcoin technology infrastructure, illustrates the bitcoin payments and explain other applications of blockchain technology.

Prerequisite

Basics on digital transaction, Internet Architecture, Security Protocols.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Observe and Explain the architecture of a blockchain network.	K1, K2
CO2	Observe and Apply the basics of decentralization.	K1,K3
CO3	Discuss and Practice the basics of security.	K1,K3
CO4	Differentiate and Use DES and AES algorithms in blockchain.	K1,K3
CO5	Correlate and Apply the bitcoin infrastructure with blockchain.	K3, K4
CO6	Demonstrate and Use the bitcoin transaction life cycle.	K2,K3
CO7	Observe, Elicit and Classify the bitcoin payment infrastructure.	K1,K2,K3
CO8	Correlate and Utilize the types of digital wallets.	K3,K4
CO9	Observe and Classify the application of blockchain in Internet of Things.	K1,K2
CO10	Discuss and Justify the application of blockchain in Government sector.	K2, K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	2	2	2	3	2	3	3	3	2	2	2.5
2	2	2	3	3	3	2	3	3	2	2	2.6
3	2	3	2	3	2	3	3	2	3	2	2.5
4	3	2	2	3	2	3	3	3	2	2	2.5
5	3	2	2	3	2	3	3	3	2	2	2.6
6	3	2	2	2	2	3	3	2	2	2	2.4
										Mean Overall Score	2.5
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	20	20	30
Understand	20	20	30
Apply	5	5	25
Analyze	5	5	15
Evaluate	-	-	-
Create	-	-	-

Participatory Assessment

- Quiz on basics of Blockchain architecture
- Quiz on basics of Bitcoin architecture
- Problem Solving in Symmetric Ciphers
- Problem Solving in Asymmetric Ciphers
- Discussions on the types of bitcoin payments
- Discussions on Applications of Blockchain

Course Content

1.BLOCKCHAIN
Introduction to Blockchain – Various technical definitions of blockchain- generic elements of a blockchain – features of a blockchain – types of blockchain – decentralization – decentralization using blockchain – methods of decentralization.

2. SYMMETRIC AND PUBLIC KEY CRYPTOGRAPHY
Cryptography – confidentiality – integrity – authentication – non-repudiation – cryptographic primitives- symmetric cryptography – stream cipher – block cipher – Data Encryption Standard (DES) – Asymmetric cryptography – public and private keys – RSA – Encryption and Decryption using RSA.

3. INTRODUCING BITCOIN
Bitcoin definition – Transaction – Transaction Life cycle – Transaction structure – Blockchain – structure of a block – structure of a block header – the Genesis Block – Mining.

4. BITCOIN NETWORK AND PAYMENTS
The Bitcoin network- wallets – wallet types - Bitcoin payments- bitcoin investments and buying and selling bitcoins.

5. BLOCKCHAIN-OUTSIDE OF CURRENCIES
Internet of Things – Physical object layer – Device layer – Network layer – Management layer – Application layer – Government – Border control – voting – Citizen identification – Health – Finance – Insurance – Financial Crime Prevention.

TEXT

Imran Bashir, "Mastering Blockchain", Second Edition, PACKT Publication.

REFERENCE

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction'",Princeton University Press, 2016.

2. Roger Wattenhofer, "The Science of the Blockchain", CreateSpace Independent Publishing Platform, 2016.

3. Melanie Swan, "Blockchain - Blueprint for a New Economy", O'Reilly Media, Inc., 2015.

4. Abhijit Das and VeniMadhavan C. E., "Public-Key Cryptography: Theory and Practice", Pearson Education India, 2009.

Course Designer Dr. A . George Louis Raja

Introduction

This course will enable you to build real-world, dynamic web sites using PHP and AngularJS framework. This course will covers Spring's Core components, POJO class, Spring Web MVC, Annotation-based (@Component), AOP and Spring tags, . It also covers integration of Spring JDBC Templates with Java EE Web applications.

Prerequisite

- Familiarity with basics of PHP, JSP and Java Bean

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Describe and Discuss the necessity of open source framework in PHP and Java.	K1,K2
CO 2	Observe and Elicit the basics of MVC concepts in AngularJS, Laravel and Spring Web.	K1,K2
CO 3	Observe and practice the knowledge of frameworks in the development of web applications	K1,K3,K6
CO 4	Analyse and Evaluate the performance of web frameworks.	K4,K5
CO 5	Ability to choose appropriate framework and practice them in real time problem applications.	K3,K4
CO 6	Draft and develop web application using open source framework.	K4,K6

Mapping of CO with PO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	3	2	2	2.6
2	3	3	2	3	2	3	3	3	2	2	2.6
3	3	3	2	3	2	3	3	3	2	2	2.6
4	3	3	2	3	2	3	3	3	2	2	2.6
5	3	3	2	3	2	3	3	3	2	2	2.6
6	3	3	2	3	2	3	3	3	2	2	2.6
									Mean Overall Score		2.6
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment

- Application development using PHP and MySQL with AngularJS.
- Customize shopping cart web site and creating admin panel using Laravel Framework.
- Application development using Spring JDBC Template.
- Generating Jasper Reports

Course Content

1. PHP WITH MYSQL AND ANGULAR JS

Accessing Your MySQL Database from the Web with PHP – Introduction to AngularJS - Angular Modules and Controllers - Input Validation - Data Binding and Templates - AngularJS Services - Interacting with Server - AngularJS, PHP and MySQL.

2. LARAVEL BASICS
Setting Up a Laravel Development Environment: System Requirements, Composer, Local Development Environments, Creating a New Laravel Project, Laravel's Directory Structure, Configuration An Introduction to Artisan, Basic Artisan commands .Router and Controllers: Route Definitions, Route Groups, Views, Controllers, Route Model Binding, Route Caching, Form Method Spoofing, CSRF Protection, Redirects, Aborting the Request, Custom Responses

3. ADVANCED LARAVEL AND API
Collecting and Validating User Data, Injecting a Request Object, Route Data, Uploaded Files, Validation, Form Requests, Eloquent Model Mass Assignment, versus Auth Controller Database Eloquent: configuration, Migration, Seeding, Query Builder, Advanced LARAVEL Request and Response: Laravel's Request Lifecycle, The Request Object, The Response Object, Laravel and Middleware Writing APIs : The Basics of REST - Like JSON APIs, Controller Organization and JSON Returns, Reading and Sending Headers, Eloquent Pagination, Sorting and Filtering, Transforming Results.

4. SPRING WITH MVC
Spring Framework Fundamentals: The Spring Framework, Dependency Injection, Application Context, Component-Scanning, Aspect-Oriented Programming (AOP) – Spring MVC Architecture: Simple Spring MVC Program – POJO Development - Implementing Controllers: Introducing Controllers, Interface-Based Controller, Annotation-Based Controller, Configuring View Controllers, Program using Controllers, ModelAttributes, PathVariable, Form Tags, Spring Tags, Type Conversion, Converter, Validating Model Attributes.

5. ADVANCED SPRING WITH MVC & REPORTING
Spring MVC with AJAX -Spring MVC with JDBC Template - Spring MVC with Hibernate -Jasper Report – Features – Reporting capabilities to java applications – Creating JRXML report – Creating Dynamic Database Report – Working Report Layout and Design Introduction to Junit.

TEXT

1. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", Fourth Edition, 2010.
2. Agus Kurniawan, "AngularJS Programming by Example", Kindle Edition, 2014.
   UNIT I
3. Matt Stauffer, "LARAVEL Up and Running, A framework for building modern PHP Apps", O'REILLY , Third Indian Reprint (ISBN: 978-93-5213-485-4).
    UNIT II & III
4. Marten Deinum, Koen Serneels, "Pro Spring MVC: With Web Flow", 2012.
   UNIT IV & V

Course Designer Prof. S. Anthony Philomen Raj

Introduction

Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. Cloud computing technology gives users access to storage, files, software, and servers through their internet-connected devices: computers, smartphones, tablets, and wearables. Cloud computing providers store and process data in a location that's separate from end users.

This course introduces the core concepts of cloud computing. The course helps to gain the foundational knowledge required for understanding cloud computing and introduces some of the prominent service providers (e.g. AWS, Google, IBM, Microsoft, etc.) the services they offer, and discuses some case studies of cloud computing across industry verticals.

Prerequisite

Basic Knowledge in Computer Architecture and Networking

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and Discuss the fundamental ideas behind Cloud Computing.	K1,K2
CO 2	List and Explain about cloud computing and the services that are available.	K1,K2
CO 3	Observe and Correlate the major three services IaaS, SaaS and PaaS.	K1,K4
CO 4	Observe the various storage services (like amazon S3) and able to practice them.	K1,K3
CO 5	Understand the benefits Cost Effectiveness of Cloud computing and Analyze the Cost Effectiveness.	K2,K4
CO 6	Analyze and Evaluate the performance of Cloud Computing	K4,K5

Mapping of CO with PO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	2	2	1	3	2	3	1	2	2.1
2	3	3	2	3	1	3	3	1	1	2	2.2
3	3	2	2	2	1	3	2	1	1	1	1.8
4	3	3	2	3	1	3	2	1	2	2	2.2
5	3	3	3	2	1	3	2	1	1	2	2
6	3	2	2	3	1	3	2	1	2	1	2
										Mean Overall Score	2.05
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	10	20
Understand	10	10	30
Apply	10	10	20
Analyze	10	10	20
Evaluate	5	5	5
Create	5	5	5

Participatory Assessment

- Quiz on basics of Cloud Computing.
- Working on the free cloud service provider.
- Working on Free PaaS like IB

Course Content

1. CLOUD COMPUTING BASICS

Cloud computing Overview – Cloud components, Infrastructure, Services - Applications – Storage, Database services - Intranets and the cloud – components, Hypervisor applications - First Movers in the Cloud - Your Organization and Cloud Computing - When you can use Cloud computing, Benefits, Limitations, Security Concerns, Regulatory Issues.

2. CLOUD COMPUTING SERVICE PROVIDER

Cloud Computing with the Titans -Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM-The Business case for going to the Cloud -Cloud Computing services- Infrastructure as a Service, Platform as a Service, Software as a Service, Software plus services, How applications help your business, Deleting your data center.

3. CLOUD COMPUTING TECHNOLOGY I

Hardware and Infrastructure Clients – Mobile, thin, Thick – Security - Data leakage, Offloading work, Logging, Forensic, Development, Auditing - Network – Basic public Internet, The accelerated Internet, Optimized Internet overlays, Cloud providers, cloud consumers, Services - Accessing the Cloud- Platforms – Web Application framework, Web hosting service, Proprietary methods - Web Applications, Web APIs - What are APIs, How APIs work, API Creators - Web Browsers.

4. CLOUD COMPUTING TECHNOLOGY II

Cloud Storage – Overview - The Basics, storage as a service, Providers, security, Reliability, advantages, cautions, Outages, Theft - Cloud storage providers - Standards - Application – Communication, Security - Client – HTML, Dynamic HTML, JavaScript - Infrastructure – Virtualization, OVF - Service – Data, Web service.

5. CLOUD COMPUTING AT WORK

Software as a Service -Overview -Advantages-Software Considerations-Vendor Advantages -Limitations -Driving Forces -Popularity -Virtualization Benefits -SaaS and SOA -Economic Impact-Company Offerings -Intuit -Google -Microsoft -IBM -Industries - Software plus Services-Overview-Pros -Cons -Vendors -Mobile Device Integration -Google Android -Providers-Adobe AIR -Apple iPhone SDK -Microsoft Online -Hybrid Model -Partnership - Active Directory.

TEXT

Anthony TVelte, Toby JVelteand Robert Elsenpeter, "Cloud Computing – A Practical Approach", Tata McGraw Hill Education Pvt Ltd, 2010.

REFERENCE

1. Syed A.Ahson and Mohammed Ilyas, "Cloud Computing and Software Services: Theory and Techniques", CRC Press, Taylor and Francis Group, 2010.

2. Judith Hurwitz, Robin Bloor, Marcia Kaufman and Fern Halper, "Cloud Computing for Dummies".Wiley-India Edition, 2010.

3. Ronald L. Krutz and Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing". Wiley Publishing, Inc., 2012.

4. Barrie Sosinky, "Cloud Computing: Bible", First Edition, Wiley Publishing, Inc., 2011.

QUESTION PAPER PATTERN

CA Tests   **Max. Marks: 50**

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.
[Atleast four questions from each unit]   6 x 2 = 12

Section B Answer **ALL** the Questions
[Atleast three questions from each unit. Either or Type]   3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.
[Atleast one question from each unit]   2 x 10 = 20

End-Semester Examinations   **Max. Marks: 100**

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.
[Atleast two questions from each unit]   10 x 2 = 20

Section B Answer **ALL** Questions.
[Either or Type, atleast one question from each unit]   5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.
[Atleast one question from each unit]   3 x 15 = 45

Course Designer   Prof. R.Veeraragavan

Introduction

Social Network Analysis (SNA) has become a widely applied method in research and business for inquiring the web of relationships on the individual, organizational and societal level.

The course offers a comprehensive training in social network analysis, covering theories, methods and applications of social networks in social sciences. It provides the basics of social network analysis at the network level, node level and at the sub-graph. It enables the students to learn about how relationships between people, artifacts, and ideas within learning settings can be analyzed and interpreted through social network analysis.

Prerequisites:

Basics of Networks and XML.

Course Outcomes
At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Understand the basic concepts and theories of social network analysis.	K1, K2
CO 2	Observe and Explain about knowledge representation using ontology.	K2
CO 3	Observe and Apply the concepts of semantic web and related applications.	K1, K3
CO 4	Model, Evaluate and Analyse social network data.	K4,K5,K6
CO 5	Discuss and Determine the ways in which networks can contribute to the explanation of social, political, economic and cultural phenomena.	K2,K5
CO 6	Device and Create knowledge representation on semantic web.	K4,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	1	2	2	2	3	1	2	2	2	2
CO2	3	2	3	3	3	3	2	3	2	2	2.6
CO3	3	3	3	3	3	3	2	2	3	2	2.7
CO4	3	2	3	2	2	3	2	2	3	3	2.5
CO5	3	2	3	2	2	3	2	3	2	2	2.4
CO6	3	2	2	3	3	3	2	3	3	3	2.7
										Mean Overall Score	2.5
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	20
Apply	10	10	20
Analyze	10	10	20
Evaluate	5	5	10
Create	5	5	10

Participatory Assessment
- Problem Solving in network level, node level and subgraph level.
- Online Quiz
- Create a knowledge representation for a given problem.

Course Content

1. INTRODUCTION TO SEMANTIC WEB
Limitations of current Web, Development of Semantic Web, Emergence of the Social Web.

2. SOCIAL NETWORK ANALYSIS
Development of Social Network Analysis - pythonKey concepts and measures in network analysis.

3. ELECTRONIC SOURCES FOR NETWORK ANALYSIS
Electronic discussion networks, Blogs and online communities - Web-based networks.

4. KNOWLEDGE REPRESENTATION ON THE SEMANTIC WEB
Ontology and their role in the Semantic Web: Ontology-based knowledge Representation –Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language.

5. MODELLING AND AGGREGATING SOCIAL NETWORK DATA
State-of-the-art in network data representation - Ontological representation of social Individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data.

TEXT

Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.

REFERENCE

1. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.

2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.

Course Designer   Dr. K. Saravanapriya

Introduction

An ERP is a system that conceptually integrates many traditional management functions and allows information to flow between them. It is designed to model and automate basic processes across the organization over a centralized database and eliminates the need of disparate systems maintained by various units of the organization.

This course gives a general understanding of Enterprise Resource Planning (ERP) software systems and their significance in businesses. It covers the fundamentals of technologies to be integrated into the system and discusses why they are beneficial to businesses. It also touches the business modules, approaches taken in ERP implementation, post implementation and the future enhancement. The case study would enable the learner to understand business process and the business benefit of ERP.

Prerequisite

Basic understanding on the business processes and how different company units operate.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and Comprehend the knowledge of business benefits of implementing the enterprise computing techniques in the industries.	K1,K2
CO 2	Examine and Assess the ERP package's technology and how they help to streamline the company process.	K3, K5
CO 3	Analyse , Evaluate and integrate ERP into various business modules.	K4,K5,K6
CO 4	Evaluate and comprehend the ERP system's pre and post implementation phases.	K6, K2
CO 5	Draft and Design ERP with future e-commerce / internet and ccompare the benefits of re-engineered business process through a case study.	K5, K6
CO 6	Recognize and Observe the importance of ERP package through case studies	K1,K2

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	1	2	1	3	2	2	2	1	2
2	3	3	1	2	1	3	1	3	2	1	2
3	3	3	2	2	1	3	2	2	2	1	2.1
4	3	2	1	2	1	3	3	2	2	1	2
5	3	3	1	1	1	3	3	1	1	1	1.8
6	2	2	1	1	1	3	2	2	2	1	1.7
										Mean Overall Score	2
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	15
Understand	10	10	20
Apply	10	10	15
Analyze	10	10	20
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment

- Explore business Process and the need for ERP
- Identify the technologies that could be integrated into ERP and bring out the business benefits.
- Explain the business modules of ERP and how they can assist the enterprise.
- Examine the ERP's pre- and post-integration of ERP with the business.
- Case study of re-engineered business process with ERP

Course Content

1. INTRODUCTION
Enterprise - An Overview – Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments – Risks of ERP – Benefits of ERP.

2. ERP AND TECHNOLOGY
ERP and Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining – On-line Analytical Processing – Product Life Cycle Management – Supply Chain Management – Customer Relationship Management – Advanced Technology and ERP Security.

3. BUSINESS MODULES AND ERP MARKET
Business Modules of an ERP Package – Financials – Manufacturing (Production) – Human Resources – Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and Service – ERP Vendors: SAP AG – Oracle Corporation – JD Edwards - Microsoft Dynamics.

4. ERP IMPLEMENTATION AND POST IMPLEMENTATION
ERP Implementation Life Cycle – Implementation Methodologies – ERP Project Teams – Process Definition – Employee and Employee Resistance – Training and Education – Success & Failure Factors of an ERP Implementation – Operation and Maintenance of the ERP System – Measuring the Performance of the ERP System – Maximizing the ERP System.

5. ERP PRESENT AND FUTURE
Turbo Charge the ERP System – Enterprise Application Integration (EAI) – ERP and E-Business – ERP, Internet, and WWW – ERP II – ERP and Total Quality Management – Future Directions and Trends in ERP - ERP Case studies: SAP at Coca-Cola Hellenic Bottling Company S.A – SAP at TATA Iron and Steel Co Ltd (TISCO) – Oracle JD Edwards at OSPAP – Microsoft Dynamics at Godrej Infotech Ltd (GITL).

TEXT

1. Alexis Leon, "ERP Demystified", Third Edition Tata McGraw-Hill, 2014.

REFERENCES

1. Jagan Nathan Vaman, "ERP in Practice", Tata McGraw-Hill, 2008.
2. Alexis Leon, "Enterprise Resource Planning", Second Edition, Tata McGraw-Hill, 2008.
3. Vinod Kumar Grag and N.K. Venkitakrishnan, "ERP- Concepts and Practice", Prentice Hall of India, 2006.
4. Mahadeo Jaiswal and Ganesh Vanapalli, "ERP", Macmillan India, 2006.
5. Summer, "ERP", Pearson Education, 2008.

Course Designer Prof. A. John Martin

Introduction

Big Data is for those who want to become conversant with the terminology and the core concepts behind big data problems, applications, and systems. It is for those who want to start thinking about how Big Data might be useful in their business or career.

This course provides an exposure to one of the most common frameworks Hadoop, NoSQL database MongoDB which has made big data analysis easier and more accessible and increasing the potential for data to transform in any processable form. Learning map-reducer concept brings openings in data analysis process.

Prerequisite
- Data Structures and Query Processing Techniques.
- Database representation such as RDBMS and XML form.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Bring out and Classify the data grouping mechanism in structured, semi-structured, and unstructured form.	K1,K2
CO 2	Observe and Give examples for how big data are organized (framework/architecture) and made used by the enterprise's (domain specific).	K1, K2
CO 3	Observe and Practice the un-structural data representation using the NoSQL database MongoDB (domain specific).	K1,K2, K3
CO 4	Infer and Device the big data file structure format using the Map-Reducer architecture style.	K1, K4
CO 5	Generalize and Practice the Map-Reducer procedure on the specified problem.	K2,K3
CO 6	Analyze and Evaluate the real data samples using Map Reducer procedure	K4.K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	1	1	2	3	3	1	2	2	2.1
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	1	1	2	3	3	2	2	2	2.2
6	3	3	2	1	1	3	3	2	2	2	2.2
										Mean Overall Score	2.3
										Result	High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (50)
	I CA (50)	II CA (50)	
Remember	10	10	30
Understand	10	10	25
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	10
Create	5	5	-

Participatory Assessment

- Making to practice the unstructured database MongoDB by forming the teams among the students. Each team will assign one domain specific problem.
- Developing the prototypes models on the domain specific problem using MongoDB.
- Map-Reduce procedure construction is get diagnosed and asked to construct the same on the assigned domain specific problem.

Course Content

1. INTRODUCTION TO BIG DATA

Types of Digital Data – Introduction to Big Data: Characteristics of Data - Big data Analytics – Classification of Analytics – Top Challenges facing in Big Data – Data Sciences – Few Top Analytics Tools.

2. BIG DATA TECHNOLOGY

Basics of NoSQL – Basics of Hadoop – Introduction to MongoDB – Terms used in RDBMS and MongoDB – Data Types used MongoDB – MongoDB Query Language.

3. HADOOP

RDBMS versus Hadoop – Distributed Computing Challenges – Hadoop Overview – Use Case of Hadoop – Hadoop Distribution – HDFS – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN.

4. MAPREDUCE FRAMEWORKS

The Configuration API – Configuring the Development Environment – Writing a Unit Test – Running Locally on the Unit Test – Running a Cluster – Turning a Job – How MapReduce Works : Anatomy of a MapReduce Job Run – Failures – Job Scheduling – Shuffle and Sort –Task Execution.

5. MAPREDUCE TYPES, FORMATS AND FEATURES

MapReduce Types and Formats: MapReduce Types - Input Formats - Output Formats – Map Reduce Features – Counters – Sorting – Joins - Side Data Distribution – MapReduce Library Classes.

TEXT

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, 2015.
   UNIT 1 - Chapter 1 - 3
   UNIT 2 - Chapter 4 and 6
   UNIT 3 - Chapter 5

2. Tom White, "Hadoop the Definitive Guide", O'Reilly Publications, Second Edition. 2010.
   UNIT 4 - Chapter 5 and 6
   UNIT 5 - Chapter 7 and 8

REFERENCE

Vignesh Prajapati, "Big Data Anlaytics with R and Hadoop", Packt Publishing, 2013.

Course Designer   Prof. V. Thomas Immanuel

PRACTICAL : PYTHON   0-0-0-6:100

1. Installation of Python, and learning interactively at command prompt and writing simple programs.
2. Learning the conditions and iterations in Python by writing and running simple programs.
3. Random number generations, and problems based on random numbers.
4. Handling tuples and exercises based on tuples.
5. Functions and files.
6. Linear and binary search.
7. Handling tokens.
8. Finding unique, and duplicate items of a list.
9. Matrix addition, multiplications, and unity matrix.
10. Text processing using python.
11. Programs related to python libraries like Numpy, Pandas, Scipy etc.
12. Django with Templates and Forms.

Course Designer   Prof. V. Thomas Immanuel

IV SEMESTER

Introduction

This course is designed to cover the fundamentals of data analytics and how to apply them to real-time data analysis. The goal of the course is to impart how to use statistical approaches for data exploration. It also emphasizes the fundamentals of R programming and the available packages for data analytics.

Prerequisite

Fundamental concepts and understaning of any programming language.

Course Outcomes

On the successful completion of the course, students will be able to:

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Recognize and Explain the nature, source and the applications of data analytics	K1, K2
CO 2	Observe and Understand the basics on R programming language and apply suitable techniques for data analytics.	K1,K2
CO 3	Visualize and Report the data from different sources	K2,K3
CO 4	Draft and Develop proficiency with statistical analysis of data	K4,K5
CO 5	Demonstrate skill in data management and conclude with the result	K3, K6
CO 6	Create and Classify the data for analytics through active and reinforcement learning	K4, K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	1	3	1	3	3	1	1	1	1.9
2	3	3	1	3	1	3	3	2	1	1	2.1
3	3	2	1	2	1	3	3	2	2	1	2
4	3	2	1	2	1	3	3	2	1	1	1.9
5	3	3	1	2	1	3	3	2	1	1	2
6	3	3	1	2	1	3	3	3	1	1	2
										Mean Overall Score	2
										Result	High

Assessment Pattern

| Bloom's Category | CA Tests (Marks Allotment) | | Term End Exam (100) |
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	10	20
Understand	10	10	20
Apply	10	10	10
Analyse	10	10	10
Evaluate	5	5	15
Create	5	5	25

Participatory Assessment

- Explain the nature, source and application of data analytics
- With suitable example demonstrate the fundamental building block of R programming
- Apply the techniques and packages required for handing data and visualize them.
- Apply various statistical / learning techniques for data analytics
- Identify the suitable technique to generate data set for "Departmental Store" and apply statistical methods to infer the future sale of the store.

Course Content

1. INTRODUCTION TO DATA ANALYSIS
Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.

2. R PROGRAMMING BASICS
Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.

3. DATA VISUALIZATION USING R
Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts

4. STATISTICS WITH R
Random Forest, Decision Tree, Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression, Logistic Regression, Survival Analysis

5. PRESCRIPTIVE ANALYTICS
Creating data for analytics through designed experiments, Creating data for analytics through active learning, Creating data for analytics through reinforcement learning

TEXT

1. "An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics".
2. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf 5.

REFERENCE

1. Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013

2. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.
3. G Casella and R.L. Berger, Statistical Inference, Thomson Learning 2002.
4. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer
6. Hastie, Trevor, et al.The elements of statistical learning.Vol. 2. No. 1. New York: springer, 2009.
7. Montgomery, Douglas C., and George C. Runger.Appliedstatistics and probability for engineers. John Wiley &Sons, 2010
8. Joseph F Hair, William C Black etal , "Multivariate Data Analysis" , Pearson Education, 7th edition, 2013.
9. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
10. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.

Course Designer: Prof. A. John Martin

Introduction

Data and Information Security refers to the technique to prevent unauthorized access, use, deletion or disruption of data or information. The concept of data and information security rests in ensuring the four basic security principles viz. confidentiality, authentication, integrity and non-repudiation. The security principles are enforced through cryptographic algorithms, protocols or standards.

This course aims to deliver the basics of data and information security, outlines on the four basic principles of data and information security, highlights the cryptographic algorithms, teaches the symmetric and asymmetric cipher algorithms, stresses on the internet security protocols and user authentication methods.

Prerequisite

Network architecture, TCP/IP Model.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Observe and Discuss the basic principles of security.	K1,K2
CO2	Observe and Apply the substitution and transposition methods.	K1,K3
CO3	Recognize and Compute symmetric ciphers	K1,K3
CO4	Tabulate and Compute Asymmetric ciphers	K1,K3
CO5	Observe , Discuss and Correlate the concept of digital signatures with security	K1,K2,K4
CO6	Recognize and Express the structure of Public Key Interfaces.	K1,K2
CO7	Observe and Explain the basic concepts in Internet Security.	K1,K2
CO8	Observe and Use the Internet Security Protocols.	K1,K3
CO9	Recognize and Operate the User Authentication Methods.	K1,K3
CO10	Recognize and Assess the architecture of kerberos.	K1,K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	2	3	2	3	3	3	2	2	2.4
2	3	2	3	3	3	2	3	3	2	2	2.5
3	2	3	2	3	2	3	3	2	3	2	2.5
4	3	2	2	3	2	3	3	3	2	2	2.5
5	3	2	3	3	2	3	3	3	2	2	2.5
6	3	2	3	2	2	3	3	2	2	2	2.3
									Mean Overall Score		2.5
									Result		High

Assessment Pattern

| Bloom's Category | CA Tests (Marks Allotment) | | Term End Exam (100) |
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	10	20
Understand	15	15	30
Apply	15	15	30
Analyze	5	5	10
Evaluate	5	5	10
Create	-	-	-

Participatory Assessment

- Quiz on basics of Data and Information Security
- Problem Solving in Cryptography
- Problem Solving in Symmetric Ciphers
- Problem Solving in Asymmetric Ciphers
- Discussions on Internet Security Protocols
- Discussions on User Authentication Methods

Course Content

1. ATTACKS ON COMPUTERS AND COMPUTER SECURITY

Concepts of Security: Need for Security, Security Approaches, Principles of Security, Types of Attacks - Cryptography: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.

2. SYMMETRIC KEY ALGORITHMS

Algorithm Types and Modes, Data Encryption Standard (DES), RC4, RC5, Blowfish, - Asymmetric Key Algorithms: Brief History of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography.

3. RSA, DIGITAL SIGNATURES AND PKI

The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Attacks on Digital Signature - Public Key Infrastructure (PKI): Digital Certificates, Private Key Management, PKIX Model, Public Key Cryptography Standards (PKCS).

4. INTERNET SECURITY PROTOCOLS

Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol, Email Security.

5. USER AUTHENTICATION AND KERBEROS

Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Key Distribution Center (KDC), Security Handshake Pitfalls, Single Sign on (SSO) Approaches.

TEXT

A. Kahate, "Cryptography and Network Security", Third Edition, Tata McGraw Hill, New Delhi, 2013.

REFERENCE

1. B.A. Foronzan, "Cryptography & Network Security", Tata McGraw Hill, New Delhi, 2007.
2. S. Stalling, "Cryptography and Network Security", Pearson Education, New Delhi, 2006.

Course Designer Dr. A . George Louis Raja

Introduction:

Data mining is the analysis of data and the use of software techniques for finding patterns and regularities in sets of data.
The course examines the database architecture and technologies required for solving complex problems of data and information management, information retrieval, and knowledge discovery facing modern organizations.

Prerequisites:

Database Architecture and Statistics.

Course Outcomes:

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

CO. No.	CO - Statement	Cognitive Level
CO 1	Understand the fundamentals of Data Warehouse and Data Mining	K1, K2
CO 2	Observe and Discuss the concepts of preprocessing, association mining, clustering, classification and Regression	K1,K2
CO 3	Recognize and Explore various tools and its uses for data analysis	K1,K2
CO 4	Apply and analyze the clustering and classification techniques for a specific problem.	K4, K5
CO 5	Recognize and Solve real-world problems in business and scientific information using data mining.	K1,K4
CO 6	Recognize, Device and Build statistical predictive models using various techniques such as neural networks, decision trees and logistic regression.	K1,K5,K6

Mapping of CO with PO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	3	2	2	2	3	3	2.4
CO2	3	3	3	3	3	3	2	3	2	3	2.8
CO3	3	3	3	3	3	3	2	3	3	2	2.8
CO4	3	2	3	2	3	3	2	2	3	3	2.6
CO5	3	2	3	2	3	3	2	3	3	2	2.6
CO6	3	2	2	3	3	3	2	3	3	3	2.7
										Mean Overall Score	2.6
										Result	High

Assessment Pattern

| Bloom's Category | CA Tests (Marks Allotment) | | Term End Exam (100) |
	I CA (50)	II CA (50)	Marks Allotment
Remember	10	5	15
Understand	10	5	15
Apply	10	15	25
Analyze	10	15	20
Evaluate	5	5	15
Create	5	5	10

Participatory Assessment

- Problem Solving in Association, classification and Clustering algorithms.
- Online Quiz
- Apply the KDD process for a specific problem.

Course Content

1. INTRODUCTION TO DATA WAREHOUSING AND DATA MINING

Data Warehouse – Definition – Multidimensional Data model – Data Cube – Dimensional Modelling – Lattice of Cuboids – Summary Measures – OLAP Operations – Slicing – Dicing – Drilling – Data Warehousing Architecture – Data Mining – Definitions – KDD Vs Data Mining – Stages of KDD – Selection – Preprocessing – Transformation – Data Mining – Interpretation and Evaluation – Data Visualization Data Mining Techniques – Verification Model – Discovery Model – Discovery of Association Rules – Clustering – Discovery of Classification rules – Frequent Episodes – Deviation Detection – Issues and Challenges in Data Mining.

2. ASSOCIATION RULES

Introduction – Association rules - Definitions – Support- Association rule – Methods to discover association rules – Problem decomposition – Frequent set – Maximal Frequent set – Border set – A Priori Algorithm – Candidate generation – Pruning – Example of A Priori – Partition Algorithm – Pincer-Search Algorithm – Dynamic Item-set counting algorithm.

3. CLUSTERING TECHNIQUES

Introduction – Clustering Paradigms – Hierarchical vs Partitioning – Numeric vs Categorical – Partitioning Algorithms – k-Mediod Algorithms- PAM- Iterative Selection of Mediods – CLARA – CLARANS – Hierarchical Clustering – DBSCAN – BIRCH – CURE- Categorical Clustering Algorithms – STIRR – ROCK.

4. CLASSIFICATION AND PREDICTION

Classification – Basic Concepts – Decision Tree Induction – Attribute Selection Measures – Tree Pruning – Scalability and Decision tree induction – Visual mining for decision tree induction – Bayes' Classification methods – bayes' theorem – Naïve bayes' classification – Rule Based Classification – Using IF_THEN rules for classification – Rule extraction from a decision tree- Rule induction using a sequential covering algorithm.

5. DATA MINING TRENDS

Mining Complex Data Types – Mining Sequence Data, Time series, symbolic sequences and Biological sequences – Other methodologies of Data mining – Statistical Data Mining – Views on Data mining foundations – Visual and Audio Data mining – Data Mining Applications – Data Mining for Financial Data Analysis – Retail and Telecommunication industries – Science and Engineering – Intrusion detection and Prevention – Recommender Systems – Data mining and society – Ubiquitous and invisible data mining – Privacy, Security and Social impacts of Data mining.

TEXT BOOKS

1. Data Mining Techniques, Arun K Pujari, University Press, 2001
UNIT 1: Chapter 2, 3
UNIT 2: Chapter 4
UNIT 3: Chapter 5

2. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.
UNIT 4 : Chapter 8.1, 8.2, 8.4, 8.4
UNIT 5: 13.1,13.2,13.3,13.4

REFERENCE BOOK

Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.

Course Designer   Dr. K. Saravanapriya

MCA467B   ELECTIVE V: GAME PROGRAMMING   3-0-0-0:100

Introduction

Game programming is the software development of video games. Game programming requires substantial skill in software engineering and computer programming in a given language, as well as specialization in one or more of the following areas: simulation, computer graphics, artificial intelligence, physics, audio programming, and input. For massively multiplayer online games (MMOGs), knowledge of additional areas such as network programming and database programming are required.

The course explores principles of 2D and 3D graphics, animation, sound, and collision detection using torque game engine model/frameworks based on C language. Doing things by yourself is extremely fun and resourceful and gives you a great understanding of graphics programming.

OpenGL is a graphics API and not a platform of its own, it requires a language to operate in and it's the choice C++.

Prerequisite

- Graphics primitive type shapes, model and mathematical operation.
- Creative and artistic flair. Understanding of colour and form. Aptitude for drawing.
- Commitment to understanding and using new technology. Aptitude for computing. Able to work as part of a team.

Course Outcomes

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

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Describe and Discuss the principles of 2D and 3D graph images and handling of shapes.	K1,K2
CO 2	Observe and Demonstrate the basics of game design and development.	K1,K2
CO 3	Analyze and Evaluate the simple games in internet and customized the same and get executed.	K4.K5
CO 4	Apply and develop simple game using C, C++, languages.	K3,K6
CO 5	Draft and Design a new game	K5,K6
CO 6	Observe, Recognise and Perceive to deploy the game in internet of as desktop publisher	K1,K2,K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	3	2	2	3	3	1	2	2	2.4
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	2	1	1	3	3	2	2	2	2.2
6	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		2.4
									Result		High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	15	10	30
Understand	10	10	20
Apply	15	15	30
Analyze	5	5	5
Evaluate	5	5	10
Create	-	5	5

Participatory Assessment

- Game problem-solving skills were designed based on instructional theories.
- A child-centered participatory evaluation approach was adopted.
- The three stages were play testing, heuristic evaluation and participatory design.
- Using storyboarding, the students built low-fidelity prototypes of the game.

Course Content

1. INTRODUCTION TO 3D GAME DEVELOPMENT

The Computer Game Industry - 3D Game Genres and Styles - Game Platforms - Game Developer Roles - Publishing Your Game - Elements of a 3D Game - Game Engine – Scripts- Graphical User Interface – Models – Textures - Sound – Music - Support Infrastructure - The Torque Game Engine – Descriptions.

2. INTRODUCTION TO PROGRAMMING

Programming Concepts - Expressions - Variables - Operators – Loops – Functions - Conditional Expressions – Branching - Debugging and Problem Solving.

3. 3D PROGRAMMING CONCEPTS

3D Concepts - Coordinate Systems - 3D Models .- 3D Shapes - Displaying 3D Models- Transformation- Rendering - Scene Graphs - 3D Audio - 3D Programming - Programmed Translation - Programmed Rotation - Programmed Scaling - Programmed Animation - 3D Audio.

4. GAME PROGRAMMING

Torque Script – Strings - Objects - DataBlocks - Game Structure - Server versus Client Design Issues - Common Functionality - Preparation -Root Main -Control Main –Initialization –Client -Server -Player -Running Emaga4.

5. GAME PLAY

The Changes – Folders - Modules -Control Modules - control/main.cs - Client Control Modules - Server Control Modules
Case study - Running Emaga5.

TEXT

Kenneth C. Finney, " 3D Game Programming", Premier Press, 1st Edition, 2004

REFERENCE

Fletcher Dunn, "3D Math Primer for Graphics and Game Development", CRC Press, 2nd Edition, 2011, ISBN-13: 978-1568817231.

Course Designer   Prof. V. Thomas Immanuel

ELECTIVE I: RESEARCH DOMAIN I

ELECTIVE II: RESEARCH DOMAIN II

a. OVERVIEW

As the Department specializes on selected technologies such as Different Types of Computing, Open Source Software Technology, Language Technology, and e-Learning, students are invited to join these research groups and they are provided an intensive training in 1st semester.

Each group of students is assigned a problem in the area of their research and asked to develop a solution or the papers to be published in Conference / Journals during 2nd and 3rd semesters.

For their final project, these students may continue their research project or be directly placed in related Research Centre's or Companies for project work and recruitment.

Based on the research focus and problems posed, the students are expected to prepare an individual technical report (at least 50 pages) on the field of their study. Theme for Technical Report in 2nd and 3rd semesters will be different. Based on the technical report, a written and oral examination is conducted.

Each student is expected to publish a paper in one of the national conferences or journals. In these research papers, they will present the outcome of their experiments and analysis.

This course aims to achieve an understanding of the research challenges by assigned readings, technical report writing, discussions and presentations on the qualitative and quantitative aspects of the subject under study. Two research outputs shall be submitted by the students as their Research Portfolio namely Technical Report and Research Survey. An input session is given on research methodology for the selected students.

b. COURSE ELEMENTS

i. RESEARCH METHODOLOGY
Input Sessions shall be given for the students in the 2th semester (fixed days or hours) to know the methodology for research work and to apply the same.

Semester II

INTRODUCTION: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question – Choice of a problem – Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code.

QUANTITATIVE METHODS: Statistical Modeling and Analysis, Time Series Analysis, Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods – Research Planning – Reflections on research – Designing experiments – Measurements and coding – Contribution – Evaluation of papers.

REPORTING: Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing - Plagiarism.

ii. TECHNICAL REPORT
Based on the research focus and problems posed, the students are expected to prepare the individual Technical Report (at least 50 pages) on the field of their study. The Technical Report (TR) is a comprehensive understanding of the subject through which students communicate their study of the subject. TR should present core understanding of the subject developed logically along clearly identified perspective. The TR must include the Concepts, Technology, Tools, and Application of the expounded topic. This report is worth 50% of the course. Theme for Technical Report in 2nd and 3rd semesters are different.

iii. RESEARCH SURVEY

Research Survey (RS) focuses on a research problem related to the selected field of work. Students should pick a problem, gather materials on the research done in the field, discuss the current state of understanding on the topic and describe particular areas where progress appears possible. This paper is worth 50% of the course. The evaluation of the research paper is done by external reviewers along with the internal supervisor. Each student is encouraged to publish the survey paper in one of the national conferences or journals.

c. TOPICS FOR RESEARCH STUDY

To facilitate students into the area of research, potential topics for study in each chosen field are given below. The students can choose one of these topics or suggest a relevant topic in consultation with the Research Supervisor, however, since the number of faculty getting into research is on the rise every year, the research areas are not limited to the below, they can be chosen according to the specialization of the supervisor.

Semester II and III

  a) *eLearning*

  b) *Data Quality Assurance*

  c) *Network and Security*

  d) *Data Analytics*

  e) *Software Metrics*

  f) *Cloud Computing*

  g) *Ontology and Semantics*

  h) *Internet of Things*

Note: *The topics mentioned above are subject to change, any upcoming research area during the period of research can be considered after being passed in the standing committee of the respective academic years.*

SOFTWARE PROJECT

a. SOFTWARE PROJECT [III SEMESTER]

- The Project work carried out by the students in the Third, and Fourth semester of MCA is individual work.
- Each student shall select a unique problem domain and develop and enhance the solution.
- Solution for the problem will be obtained by applying the technology they learnt in the previous semester.
- The solution is enhanced and stabilized by applying the technologies that they learn in the current semester.
- The solution for the problem should include DDL, DML, DCL, TCL, triggers, procedure, and function according to the need of their solution space.
- The solutions obtained in the Third, and Fourth will be considered as separate projects for evaluation. The report submitted at the end of each semester is an individual work and it has to be submitted as a PDF document.
- The student shall follow Team Software Process (TSP) model strictly for project development.
- Each student is assigned a faculty member as Project Mentor to monitor the progress of the project work.
- Different Phases of the Project work are Requirements, Analysis, Design, Implementation, Testing and Deployment
- Artifacts to be prepared during the Phases are:
    - Software Project Initiation Statement
    - User Requirement Specification (URS)
    - Software Requirement Specification (SRS)
    - Software Analysis and Design
        - Architecture Design
        - Database Design (Table Design, ER Diagram, Integrity Design)
        - Class Diagram
        - Use Case Diagram
    - Test Case Design
- Reviews shall be conducted after every phase of which two shall be mandatory.
- Thirty minutes will be allotted for each team for the review:
    - 20 minutes for Presentation.
    - 10 minutes for Queries.

b. SOFTWARE PROJECT – FINAL SEMESTER

- The project work can be either carried out in a R&D section of any Industry/University / Institute.
- A Coordinator will be appointed by the Head of the Department to coordinate the Project Work.
- Internal guides from the department will be assigned to the students.
- On joining an institution for the project work, the student shall furnish the details required by the department
- The duration of the project should be at least four months
- Periodically (weekly) the students should be send project Task Report to their internal guide through mail
- Two Reviews will be conducted before the Final Viva-Voce.
- The Project work should be an independent one; if the project is a part of a bigger project, the student's work should have a few independent modules.
- If more than one student is working on parts of the same project (big enough to share) the report of each student should be different and not two copies of the same report.