



APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

CET Campus, Thiruvananthapuram, Kerala-695016

SYLLABUS: MCA (INTEGRATED)

SEMESTER III

Course No	Master of Computer Applications (Integrated) Course (Semester 3)	Hours / week			IA marks	ESE Marks	Total	Credits	Exam slot
		L	T	P					
INMCA201	Principles of Programming	3	1	-	40	60	100	4	A
INMCA203	Probability and Statistics	3	1	-	40	60	100	4	B
INMCA205	Introduction to Object Oriented Programming	3	1	-	40	60	100	4	C
INMCA207	Accounting and Financial Management	3	1	-	40	60	100	4	D
INMCA209	Introduction to Data Structures	3	1	-	40	60	100	4	E
INMCA231	Basic Data Structures Lab	-	-	6	100		100	1	S
INMCA233	Basic Object Oriented Programming Lab	-	-	4	100		100	1	T
	TOTAL	15	5	10	400	300	700	22	

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 201	PRINCIPLES OF PROGRAMMING	3-1-0-4	2016
Course Objectives			
This course aims to give understanding of programming principles to the students, along with various programming language theories in practice.			
Syllabus			
History of Programming languages, The Role of Programming Languages, Data Types, Expressions and Assignment Statements, Subprograms, Structured Programming, Object-Oriented Programming, Elements of Functional Programming, Logic Programming.			
Expected Outcome			
At the end of the course, students would be able to			
<ul style="list-style-type: none"> • understand the programming principles; • logically analyze and evaluate programming theories and practices; 			
References			
<ol style="list-style-type: none"> 1. D. A. Watt, “Programming Language Design Concepts”, Wiley Dreamtech, 2007. 2. K. C. Loudon, “Programming Languages”, Second Edition, Thomson, 2003. 3. Ravi Sethi, “Programming Languages”, 2nd edition, Pearson Education. 4. Robert W. Sebesta, “Concepts of Programming Languages”, Eighth Edition, Pearson Education, 2008. 5. Terrance W. Pratt, “Programming Languages”, 4th edition, Pearson Education. 			
MOOC References			
<ul style="list-style-type: none"> • Principles of Programming: http://www.nptelvideos.in/2012/11/principles-of-programming-languages.html 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	<p>Evolution of the Major programming languages: The Role of Programming Languages - Toward Higher-Level Languages, Problems of Scale, Programming Paradigms, Language Implementation: Bridging the Gap. [Ref 3]</p> <p>Language Description: Syntactic Structure - Expression Notations, Abstract Syntax Trees, Lexical Syntax. [Ref 3]</p> <p>Functional Programming: LISP, Object-Oriented Programming: Smalltalk. [Ref 4]</p>	9	15%
II	<p>Data Types: Primitive Data Types, Character String Types, User Defined Ordinal Types, Array Types, Associative array – Structure and Operations, Union Types, Record Types, Pointer and Reference Types. Names, Variables, Concept of binding, Type checking, Strong Typing, Type compatibility, Scope, Lifetime. [Ref 4]</p>	9	15%
FIRST INTERNAL EXAMINATION			
III	<p>Expressions and Assignment Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed mode. Control Structures: Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements. [Ref 4]</p>	10	20%
IV	<p>Subprograms: Fundamentals of Subprograms, Local Referencing Environments, Parameter passing methods, Overloaded Subprograms, Generic Subprograms. [Ref 4]</p>	10	20%
V	<p>Structured Programming: The need for structured programming, Syntax-Directed Control Flow, Design Consideration, Handling Special Cases In Loops.</p> <p>Elements of Functional Programming: Types Values and Operations, Approaches to Expression Evaluation. [Ref 3]</p> <p>Functional Programming Languages: Introduction, Fundamentals of Functional Programming Languages, The First Functional Programming Language: LISP, List Functions, Common LISP [Ref 4]</p>	10	15%
SECOND INTERNAL EXAMINATION			

VI	Object-Oriented Programming: Constructs for Program Structuring, Information Hiding, Program Design with Modules, Modules and Defined Types, [Ref 3] Implementation of inheritance, polymorphism, features of Object Oriented languages, [Ref 3] Exception handling. [Ref 4]	8	15%
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END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 203	PROBABILITY AND STATISTICS	3-1-0-4	2016
Course Objectives			
The purpose of this course is to understand various descriptive measures of Statistics and Probability theory in Computer Science.			
Syllabus			
Measures of Central Tendency, Measures of Dispersion, Skewness, Moments, Kurtosis, Correlation, Regression, Probability, Independent Events, Bayes Theorem, Random Variables, Probability Density Function, Distribution Function, Mathematical Expectation, Binomial Distribution, Poisson Distribution, Exponential Distribution, Uniform Distribution, Normal Distribution.			
Expected Outcome			
At the end of the course, students should be able to			
<ul style="list-style-type: none"> • interpret a set of descriptive Statistics including measures of Central Tendency and measures of Dispersion; • understand moments as a convenient method for summarizing several descriptive Statistical methods; • describe the nature of the relationship between two variables; • understand the basic principles of Probability; • understand random variables and probability distributions; • apply theoretical distributions to various real world problems; 			
References			
<ol style="list-style-type: none"> 1. Hogg R. V. & Craig Allen T., “Introduction to Mathematical Statistics”, Fifth edition, Pearson Education (Singapore) Pvt. Ltd. 2. John E. Freund’s “Mathematical Statistics with applications”, Seventh edition, Pearson Prentice Hall, 2014. 3. Murray R. Spiegel, John Schiller, R. Alu Srinivasan, “Probability and Statistics”, Fourth edition, Schaums outline series, 2013. 4. S. C. Gupta, “Fundamentals of Statistics”, Seventh edition, Himalaya Publishing House, 2012 5. S. C. Gupta, V. K. Kapoor, “Fundamentals of Mathematical Statistics”, Tenth edition, Sultan Chand Publications, 2010. 6. T. Veerarajan, Probability, “Statistics and Random Processes”, Third edition, McGraw Hill Education (India) Private Limited, 2010. 			
MOOC References: http://nptel.ac.in/courses/111105090/			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Measures of Central tendency & Dispersion: Measures of Central Tendency, Arithmetic Mean, Median, Partition Values, Mode, Measures of Dispersion, Absolute and relative measures of dispersion, Range, Quartile Deviation, Mean Deviation, Standard deviation, Coefficient of Variation. [Ref 4: Sections 5.3, 5.4, 5.6, 5.7, 6.1-6.6, 6.8, 6.9, 6.11, 6.12]	10	15%
II	Moments, Skewness & Kurtosis: Moments: Raw Moments and Central Moments, Moment Generating Function, Skewness, Definition and Types of Skewness, Measures of Skewness, Karl Pearson's and Bowley's coefficient of Skewness Kurtosis. [Ref 4: Sections 7.1-7.6]	8	15%
FIRST INTERNAL EXAMINATION			
III	Correlation and Regression Analysis: Correlation: Introduction, Types of Correlation, Karl Pearson's Correlation Co-efficient, properties of Karl Pearson's Correlation Co-efficient, Rank Correlation-Spearman's Rank Correlation, Co-efficient Regression: Introduction, Lines of Regression, Regression Co-efficient, Correlation Analysis vs Regression Analysis. [Ref 4: Sections 8.1, 8.4, 8.6, 8.7, 9.1, 9.3, 9.4-9.6, 9.8, 9.9]	9	15%
IV	Probability: Random Experiment, Sample Space, Event, Classical and axiomatic definitions of Probability, Addition Theorem of Probability, Conditional Probability of two events, Multiplication Theorem, Independence of Events, Bayes' Theorem. [Ref 4: Sections 12.1, 12.3, 12.5-12.11]	9	15%
V	Random Variables & Mathematical Expectation: Discrete and Continuous Random Variables, Probability Mass Function (pmf) and Probability Density Function (pdf)-properties and examples, Cumulative Distribution Function and its properties, Joint and Marginal Density Function, Mathematical Expectation, Variance and Covariance in terms of expectation. [Ref 4: Sections 13.1-13.10]	10	20%
SECOND INTERNAL EXAMINATION			

VI	Theoretical Probability Distributions: Discrete Probability Distributions, Binomial Distribution, Poisson Distribution, Continuous Probability Distributions, Exponential Distribution, Uniform Distribution and Normal Distribution. [Ref 6: Chapter 5]	10	20%
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END SEMESTER EXAMINATION

Proofs of theorems and properties are not required except for theoretical probability distributions (module VI).

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each ($8 \times 3 \text{ M} = 24 \text{ M}$). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module ($6 \times 6\text{M}=36\text{M}$). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 205	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING	3-1-0-4	2016
Course Objectives			
To understand the concepts of object-oriented programming and master OOP using C++.			
Syllabus			
This contains the basics of C++ programming and the fundamentals of expressions, functions, control flow, data structures, loops, arrays, pointers, managing I/O, and object oriented programming using classes.			
Expected Outcome			
At the end of the course, students would be able to			
<ul style="list-style-type: none"> ● describe the important concepts of object oriented programming like object and class, encapsulation, inheritance and polymorphism; ● use features of C++ like type conversion, inheritance, polymorphism, I/O streams and files to develop programs for real life problems; ● use advance features like templates and exception to make programs supporting reusability and sophistication; ● use standard template library for faster development; ● develop the applications using object oriented programming with C++; 			
References			
<ol style="list-style-type: none"> 1. Ashok N. Kamthane, “Object Oriented Programming with ANSI and Turbo C++”, Pearson Education. 2. Deitel and Deitel, “C++: How to Program”, 9th Edition, Pearson Education Asia, 2014. 3. E. Balagurusamy, “Object Oriented Programming With C++”, Fourth Edition, TMH, 2008. 4. Robert Lafore, “Object Oriented Programming in Turbo C++”, Fourth Edition, Galgotia. 5. Saurav Sahay, “Object Oriented Programming with C++”, Second Edition, Oxford. 6. Schildt Herbert, “The Complete Reference C++”, Fourth Edition, Tata McGraw Hill. 7. Steven Holzner, “C++ Programming”, Black Book, Dreamtech, 2001. 			
MOOC References			
<ul style="list-style-type: none"> ● Complete C++ video course : http://www.studytonight.com/courses/cpp-video-tutorial/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Concepts of OOP: Introduction to OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP. C++ Basics: Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures, Pointers in C++, Pointers and Objects, this pointer. [Ref 3]	9	15%
II	C++ Functions: Simple functions, ‘Call and Return’ by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions. [Ref 3]	9	15%
FIRST INTERNAL EXAMINATION			
III	Objects and Classes: Basics of object and class in C++, Private and public members, static data and static function, constructors and their types, destructors, operator overloading, type conversion [Ref 3]	10	20%
IV	Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class. virtual and pure virtual functions, Implementing polymorphism. [Ref 3]	10	20%
V	I/O and File Management : Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files. [Ref 3]	10	15%
SECOND INTERNAL EXAMINATION			
VI	Templates and Exceptions: template, function templates and class templates, Introduction to exception, try-catch, throw, multiple catch, catch all, rethrowing exception, implementing user defined exceptions. [Ref 3]	8	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
There will be two parts in the Question paper - Part A and Part B.			
Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.			
Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice			

question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code.	Course Name	L-T-P-Credits	Year of Introduction
INMCA 207	ACCOUNTING AND FINANCIAL MANAGEMENT	3-1-0-4	2016
<p>Course Objectives</p> <p>This course aims to give a basic understanding of accounting and financial management to the students, along with various sources of finance and financial control techniques in practice.</p>			
<p>Syllabus</p> <p>This course is a continuation of INMCA109- Fundamentals of Accountancy.</p> <p>Definition, functions of financial management, financial analysis, planning and control through ratio analysis, cash flow analysis, fund flow analysis and cost analysis. Indian financial system, long term and short term sources of funds.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be</p> <ul style="list-style-type: none"> ● able to understand the financial activities of a business organization; ● able to understand the financial system in India and various sources of funds; ● able to understand the various cost control measures; ● able to critically analyze and evaluate financial control process and practices; 			
<p>References</p> <ol style="list-style-type: none"> 1. I.M. Pandey, “Financial Management”, Vikas Publishing House. 2. Ruddar Dutt & KPM Sundharam, “Indian Economy”, S Chand. 3. S.N. Maheshwari, Maheshwari S. K., “Introduction to Accountancy”, Eleventh Edition, Vikas Publication, New Delhi, (2013). 4. Shashi K. Gupta, Nisha Aggarwal, “Capital Market and Financial Services”, Kalyani Publishers 5. Srinivasan & Murugan, “Accounting for Management”, First Edition, S.Chand & Company Ltd, (2006). 			
<p>Web References</p> <ol style="list-style-type: none"> 6. Crowd funding https://www.fundable.com/learn/resources/guides/crowdfunding-guide/what-is-crowdfunding 7. Private equity http://www.wikinvest.com/concept/Private_Equity 8. Venture capital http://www.edupristine.com/blog/venture-capital 			
<p>MOOC References</p> <ul style="list-style-type: none"> ● Fundamentals of Financial Management - http://nptel.ac.in/courses/110106043/3 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Financial Management: Introduction, nature and scope, Functions of financial management, Investment decision, financing decision, dividend decision and liquidity decision, Financial goal, profit maximization/wealth maximization. [Ref 5]	8	15%
II	Financial analysis, planning and control: Ratio Analysis: Ratio meaning, profitability ratios, profit in relation to sales, profit in relation to investments, Liquid ratios, Solvency ratios, other ratios, Activity ratios, Fund Flow Statement, Meaning, Importance, Definition of terms, Funds and Flow, Sources and use of funds, Changes in working capital, Preparation of funds flow statements (Basics). [Ref 5]	12	20%
FIRST INTERNAL EXAMINATION			
III	Cash flow statements: Sources of cash, Cash from operations, cash from investing activities and financing activities, Uses of cash flow statement, preparation. [Ref 5]	8	15%
IV	Cost accounting: Costing, elements of cost material, cost, labor cost, overheads and components of cost, prime cost, works cost, cost of production and total cost. Costing Techniques, cost volume profit analysis, Break even analysis. Cost Reduction: Difference between cost control and cost reduction, steps involved in introducing a cost reduction program. [Ref 5]	10	20%
V	Indian financial system: Meaning, Components Institutions, types of financial institutions, banking and non-banking, Financial markets, money market and capital market, Functions of money market, Money Market Instruments. [Ref 2, 4]	9	15%
SECOND INTERNAL EXAMINATION			
VI	Long term sources of finance: Indian capital markets, objectives, functions, components. Stock markets, new issue market and secondary markets, Long term financing, debentures [Ref 2, 4], venture capital financing, [Ref 8] private equity, [Ref 7] crowd funding. [Ref 6]	9	15%

END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each ($8 \times 3 \text{ M} = 24 \text{ M}$). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module ($6 \times 6\text{M}=36\text{M}$). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code.	Course Name	L-T-P-Credits	Year of Introduction
INMCA 209	INTRODUCTION TO DATA STRUCTURES	3-1-0-4	2016
Course Objectives To understand the different methods of organizing large amount of data and implement different data structures efficiently for specific problems.			
Syllabus Introduction, Data type, Data object, ADT, Types of Data Structure, Algorithm analysis, Asymptotic notations, Linear Data structures -Arrays, Sorting and searching Methods, linked Lists, Stacks, Queues, Trees- Binary tree, Binary search trees, AVL tree, Graph- Terminology, representation, Traversal.			
Expected Outcome At the end of the course students would be <ul style="list-style-type: none"> ● able to solve problems systematically; ● able to critically analyze and evaluate various data structures; ● able to implement various data structures and to use it in problem solving; 			
References <ol style="list-style-type: none"> 1. D. Samanta, "Classic Data Structures", Second Edition, PHI, 2006. 2. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Second Edition, Silicon, 2007. 3. Rohit Khurana, "Data Structures using C", First Edition, VIKAS, 2014. 			
MOOC References <ul style="list-style-type: none"> ● Data Structures and Algorithms: https://cosmolearning.org/courses/data-structures-and-algorithms/ ● Programming and Data Structure: https://cosmolearning.org/courses/programming-and-data-structure-543/video-lectures/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Introduction to Data Structures: Introduction to data structures, Concept, Data type, Data object, ADT-Definition-Operation-examples on rational number, Need of Data Structure, Types of Data Structure[Ref 3], Algorithm analysis: Algorithm- definition-characteristics, Space complexity, time complexity, Asymptotic notation (Big O, Theta Θ). [Ref 2]	9	15%
II	Linear data structures, Concept of arrays, Two dimensional arrays Row/column major representation[Ref 1], Searching techniques, Linear Search, Binary search, Sorting algorithms with time and space complexity, Bubble sort, Insertion sort, Merge sort, Quick Sort. [Ref 2]	10	20%
FIRST INTERNAL EXAMINATION			
III	Linear Lists: Concept and representation, singly linked list, circular linked list, Header node, operations on linked list-create-display-insertion-deletion, reversing a linked list, searching a linked list, concatenating two linked lists, concept of doubly linked list. [Ref 1]	9	15%
IV	Stacks: Definition and concept, Operations on stacks, Static and Dynamic Implementation of stack, Applications of stacks, infix to postfix, postfix evaluation, Simulating recursion using stack. [Ref 3]	9	15%
V	Queues: Definition and concept, Operations on queue, Static & Dynamic implementation of Queue, Circular queue, concept of priority queue, Concept of doubly ended queue, Applications of queues. [Ref 3] Graph: Concept & terminologies, Graph Representation. Traversals: BFS and DFS. [Ref 1]	10	20%
SECOND INTERNAL EXAMINATION			
VI	Trees: Introduction and Definition of Trees, Tree Terminology, Binary Tree, Representing Binary Tress in Memory, Traversing Binary Tree: Preorder, In-order, Post-order traversal, BST – creation, insertion, deletion and traversal. Balanced trees, AVL tree. [Ref 1]	9	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each ($8 \times 3 \text{ M} = 24 \text{ M}$). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module ($6 \times 6\text{M}=36\text{M}$). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code.	Course Name	L-T-P-Credits	Year of Introduction
INMCA 231	BASIC DATA STRUCTURES LAB	0-0-6-1	2016
Course Objectives To understand the different methods of organizing large amount of data and implement different data structures efficiently for specific problems using ‘C’ language.			
Syllabus Introduction, Data type, Data object, Types of Data Structure, Algorithm analysis, Linear Data structures -Arrays, Sorting and searching Methods, linked Lists, Stacks, Queues, Trees- Binary tree, Binary search trees, Graph- Terminology, representation, Traversal.			
Expected Outcome At the end of the course, students would be able to: <ul style="list-style-type: none"> • Assess how the choice of data structures and algorithm design methods impacts the performance of programs; • Choose the appropriate data structure and algorithm design method for a specified application; • Write programs using object-oriented design principles; • Solve problems using data structures such as linear lists, stacks, queues, binary trees; 			
References <ol style="list-style-type: none"> 1. D. Samanta, “Classic Data Structures” Second Edition, Phi Learning, 2009. 2. Ellis Horowitz and Sartaj Sahni, “Fundamentals of data structures” Galgotia, 1994. 3. Rohit Khurana,” Data Structures using C “, First Edition, Vikas Publishing, 2014. 			
MOOC References <ul style="list-style-type: none"> • Data Structures and Algorithms: https://cosmolearning.org/courses/data-structures-and-algorithms/ • Programming and Data Structure: https://cosmolearning.org/courses/programming-and-data-structure-543/video-lectures/ 			

Experiments	Contents
I	Introduction to Data Structures: Array operations, Insertion, Deletion, Traversal, Concatenation of two arrays, Polynomial addition using Arrays.
II	Searching Algorithms: Linear search, Binary search, Interpolation search. Sorting algorithms: Bubble sort, Insertion sort, Quick Sort.
III	Singly linked list: Implementation, searching a linked list, concatenating two linked lists, circular linked lists using singly linked list, Polynomial addition using Linked List.
IV	Stacks: Operations on stacks, Implementation of stack using array and linked list.
V	Queues: Operations on queue, Implementation of Queue using array and linked list, Circular Queue using linked list.
VI	Binary Tree: Insertion, Deletion, Traversing Binary Tree: (Preorder, In-order, Post-order).
VII	Graph: Traversal (BFS, DFS)

***End Semester Examination will be conducted internally by the College.**



Course Code.	Course Name	L-T-P-Credits	Year of Introduction
INMCA 233	BASIC OBJECT ORIENTED PROGRAMMING LAB	0-0-4-1	2016
Course Objectives			
To understand the concepts of object-oriented programming and master OOP using C++.			
Syllabus			
This contains the basics of C++ programming and the fundamentals of expressions, functions, control flow, data structures, loops, arrays, pointers, managing I/O, and object oriented programming using classes.			
Expected Outcome			
At the end of the course, students would be able to			
<ul style="list-style-type: none"> • describe the important concepts of object oriented programming like object and class, Encapsulation, inheritance and polymorphism; • use features of C++ like type conversion, inheritance, polymorphism, I/O streams and files to develop programs for real life problems; • use advance features like templates and exception to make programs supporting reusability and sophistication; • use standard template library for faster development; • develop the applications using object oriented programming with C++; 			
References			
<ol style="list-style-type: none"> 1. Ashok N. Kamthane, “Object Oriented Programming with ANSI and Turbo C++”, Pearson Education. 2. Deitel and Deitel, ”C++: How to Program”, Ninth Edition, Pearson Education Asia, 2014. 3. E. Balagurusamy, “Object Oriented Programming with C++”, Fourth Edition, TMH, 2008. 4. Robert Lafore, “Object Oriented Programming in Turbo C++”, Fourth Edition, Galgotia. 5. Saurav Sahay, “Object Oriented Programming with C++”, Second Edition, Oxford. 6. Schildt Herbert, “The Complete Reference C++”, Fourth Edition, Tata McGraw Hill. 7. Steven Holzner, “C++ Programming”, Black Book, Dreamtech, 2001. 			
MOOC References			
<ul style="list-style-type: none"> • Complete C++ video course : http://www.studytonight.com/courses/cpp-video-tutorial/ 			

Experiments	Contents
I	Simple C++ Programs to Implement Various Control Structures. a. if statement b. switch case statement c. for loop d. while loop e. do while loop
II	Program to implement functions with default arguments. Program to implement call by value and call by reference. Program to demonstrate friend functions and friend classes.
III	Programs to understand the concepts of class and objects. Programs to understand member functions and inline functions. Programs to implement static functions and static data. Program to perform all possible type conversions.
IV	Programs to demonstrate function overloading. Programs to overload unary & binary operators as member function & non-member function. Programs to implement different types of inheritances like single, multiple, multilevel and hybrid. Program to demonstrate the use of virtual base class. Program to demonstrate the use of virtual functions. Program to demonstrate the use of abstract classes.
V	Programs to implement sequential and random file accessing.
VI	Program to implement Exception Handling. Programs to create a generic stack class and member functions to perform stack operations. Programs to create and overload the function templates.

***End Semester Examination will be conducted internally by the College.**



**APJ ABDUL KALAM TECHNOLOGICAL
UNIVERSITY**

CET Campus, Thiruvananthapuram, Kerala-695016

SYLLABUS: MCA (INTEGRATED)

SEMESTER IV

Course No	Master of Computer Applications (Integrated) Course (semester 4)	Hours / week			IA marks	ESE Marks	Total	Credits	Exam slot
		L	T	P					
INMCA202	Introduction to Visual Programming	3	1	-	40	60	100	4	A
INMCA204	Applied Statistics	3	1	-	40	60	100	4	B
INMCA206	Introduction to Operating Systems	3	1	-	40	60	100	4	C
INMCA208	Elements of Business Management	3	1	-	40	60	100	4	D
INMCA212	Internet Concepts and Web Design	3	1	-	40	60	100	4	E
INMCA232	Visual Programming Lab	-	-	6	100		100	1	S
INMCA234	Statistics Lab	-	-	4	100		100	1	T
	TOTAL	15	5	10	400	300	700	22	

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 202	INTRODUCTION TO VISUAL PROGRAMMING	3-1-0-4	2016
Course Objective			
The aim of the course is to give students basic information about the visual programming concepts using .NET library, and to enable them to design and code visual programs.			
Syllabus			
Introduction to .NET Framework and Development Environment, VB.NET and Programming, Object Oriented Features of VB.NET, Windows Forms and Controls, Menus and Dialog-Boxes, Files, ADO .NET.			
Expected Outcome			
At the end of the course, students would be able to			
<ul style="list-style-type: none"> • Build and Deploy Windows and Web applications; • Familiarize with event driven programming; • Build GUI programming; 			
References			
<ol style="list-style-type: none"> 1. C. Komalavalli, Sanjib K Sahu, “Essentials of .Net Programming Theory and Application”, Ane Books Pvt. Ltd, 2016. 2. Clayton E. Crooks, “Learning Visual Basic .NET Through Applications”, First Edition, Hingham, Mass: Charles River Media, C2003. 3. Shirish Chavan, “Visual Basic .NET”, First Edition, Pearson Educations, 2004. 4. Steven Holzner, “Visual Basic .NET Programming. Black Book”, New Edition, Dreamtech Press, 2005. 			
MOOC References			
<ul style="list-style-type: none"> • https://class.coursera.org/cs101 • http://www.nptelvideos.com/visualbasic_net/visualbasicnet_video_tutorials.php • http://www.vtc.com/products/Microsoft-Visual-Basic-for-Applications-(VBA)-Tutorials.htm • https://www.edx.org/course/introduction-visual • https://www.edx.org/course/introduction-visual-programmingmitx-6-00-1x-8 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	<p>Introduction to .NET Framework and Development Environment-Evolution of .NET, Introduction to .NET, Advantages of .NET Framework, Versions, Supported Applications, Architecture –Introduction and Components-CLR, Common Type System, Class Libraries.</p> <p>Namespaces, Assemblies, Execution Process, Memory Management, Object Oriented Features-Class, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism.</p> <p>Code Access Security model, Exception handling.</p> <p>Visual Studio .NET integrated development, Elements of IDE, Project templates, Writing a simple application using .NET, Visual Basic terms. [Ref 1]</p>	9	15%
II	<p>Data Types-Number, Character, Other, Default values of data types.</p> <p>Variables-Constants, Identifiers. Scope of the variables-Block Scope, Procedure scope, module, namespace scope, shadowing.</p> <p>Access control-public, private, protected, friend. [Ref 1]</p>	10	20%
FIRST INTERNAL EXAMINATION			
III	<p>Operators: Arithmetic, Comparison, Assignment, Logical, Concatenation, Operator Precedence.</p> <p>Control Structures-Decision making, looping, other statements.</p> <p>Arrays-Static and Dynamic. Arrays and functions. Procedures and functions-sub procedures, function procedures, event procedures.</p> <p>Parameter passing -pass by value, pass by reference, optional arguments, named arguments. Predefined functions- MsgBox functions, Inputbox functions, other functions. [Ref 1]</p>	9	15%

IV	<p>Windows Forms and controls, Menus and Dialog-Boxes, Files - Introduction to Windows Forms, Windows Forms-Properties and Methods, Events, MDI Forms.</p> <p>Controls-Common properties and methods. Label, Text Box, Link Label, Button, Radio Button, Checkbox, List Box, Combo Box, Picture Box, Timer Control, HScrollbar and VScrollbar. [Ref 1]</p>	9	15%
V	<p>Menus-Basic elements of Menu, Generic procedure of creating menu, Creating a simple menu application, Enhancing a simple menu application, Modifying the existing menu, assigning and removing shortcut keys. Using dialog-Boxes.</p> <p>Working with Files-Introduction, reading from a file and writing to a file. .[Ref 1]</p> <p>Web Controls: HTML controls. [Ref 4]</p>	10	20%
SECOND INTERNAL EXAMINATION			
VI	<p>Database Connectivity Using ADO.NET- Evolution of ADO.NET, Features, ADO v/s ADO.NET. Overview of Data provider, provider objects - Connection, Command, Data adapter, Data Reader. Overview of Dataset-Types, Dataset object model-Data table, Data row and Data Column, Data Relations. Connectivity coding using command objects, Data binding-Simple and complex. [Ref 1,4]</p>	9	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p> <p>The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.</p>			

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 204	APPLIED STATISTICS	3-1-0-4	2016
<p>Course Objectives</p> <p>This course aims to provide basic estimation and detection background for those who are responsible for understanding the appropriate models to analyze the data and to implement them computationally.</p>			
<p>Syllabus</p> <p>Time Series Analysis, Sampling distributions, Estimation of Parameter, Testing of Hypotheses, Large Sample Test, Small Sample Test, Statistical Quality Control, Analysis of Variance.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students should be able to</p> <ul style="list-style-type: none"> • describe and verify mathematical considerations for analyzing time series; • familiar with the concept of statistical inference; • apply estimation methods to estimate the parameters for small samples; • use various statistical quality control tools and techniques including various variable and attribute control charts as well as sampling plans; • perform analysis of variance; 			
<p>References</p> <ol style="list-style-type: none"> 1. John E. Freund's "Mathematical Statistics with applications", Seventh Edition, Pearson Prentice Hall, 2014. 2. Murray R. Spiegel, John Schiller, R. Alu Srinivasan, "Probability and Statistics", Fourth Edition, Schaums Outline Series, 2013. 3. Richard A. Johnson, Miller & Freund's "Probability & Statistics for engineers", Fifth Edition, Prentice Hall, 1994. 4. S. C. Gupta V.K. Kapoor, "Fundamentals of Mathematical Statistics", Tenth Edition, Sultan Chand Publications, 2010. 5. S. C. Gupta, "Fundamentals of Statistics", Seventh Edition, Himalaya Publishing House, 2012. 6. T. Veerarajan, "Probability, Statistics and Random Processes", Third Edition, Mc Graw Hill Education, New Delhi, 2010. 			
<p>MOOC References</p> <ul style="list-style-type: none"> • http://nptel.ac.in/courses/111105041/17 • https://www.coursetalk.com/subjects/statistics/courses • http://www.learnerstv.com/Free-Maths-video-lecture-courses.htm 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	<p>Time Series: Introduction, Components of a Time Series, Analysis of Time Series, Mathematical Models for Time Series. Measurement of Trend-Graphical Method, Method of Semi-Averages, Method of Curve Fitting, Method of Moving Averages.</p> <p>Measurement of seasonal variation- Method of Simple Averages, Ratio to Trend Method, Ratio to Moving Average Method, Link Relative Method. Measurement of cyclical variation, Measurement of irregular variations. [Ref 4 Sections11.1-11.8]</p>	9	15%
II	<p>Sampling Distribution & Estimation Theory: Population, Sampling, Parameter and statistic, Sampling distribution, standard errors, Limitations of sampling, Types of sampling.</p> <p>Estimation of Parameter: Point Estimation, Properties of a good estimator-unbiasedness, consistency, sufficiency, efficiency.</p> <p>Methods of point estimation-Maximum Likelihood Estimation, Interval Estimation. [Ref 4 Sections15-1-15.7,15.10-15.16]</p>	9	15%
FIRST INTERNAL EXAMINATION			
III	<p>Testing of Hypotheses: Concepts of Hypothesis, Simple and Composite Hypothesis, Null Hypothesis, Alternate Hypothesis, Types of errors, Level of significance, Critical region, power of test, Procedure for testing of Hypothesis (Rejection region method only)</p> <p>Large Sample Test: Large sample tests concerning mean, equality of means, proportions, equality of proportions. [Ref 4 Sections15-1-15.7,15.10-15.16]</p>	9	15%
IV	<p>Small Sample Test: Small sample test: t test for mean, equality of means and paired t test, Tests based on F distribution. Tests based on chi square distribution for variance, goodness of fit and for independence of attributes. [Ref 4 Sections19-5-19.8,19.10,18.1-18.4-18.8]</p>	9	15%
SECOND INTERNAL EXAMINATION			
V	<p>Statistical Quality Control (S.Q.C.): Introduction, Process and</p>	10	20%

	Product Control, Control Charts, $3 - \sigma$ Control limits, Tools for Statistical Quality Control, Control Charts for Variables-Mean, Range and Standard Deviation, Control Charts for Attributes- p – chart, np –chart, c –chart, Acceptance Sampling Plans, Dodge and Romig Sampling Inspection Plans. [Ref 4 Sections 21.1-21.15]		
VI	Analysis of Variance: Aim of Design of Experiments, Basic Principles of Experimental Design, Some Basic Designs, Completely Randomized Design (C.R.D.), Randomized Block Designs (R.B.D.), Latin Square Design (L.S.D.), Comparison of R.B.D. and L.S.D. [Ref 6 Chapter 10]	10	20%

END SEMESTER EXAMINATION

Proofs of theorems and properties are not required.

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each ($8 \times 3 \text{ M} = 24 \text{ M}$). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module ($6 \times 6\text{M}=36\text{M}$). The maximum number of sub part questions in Part B to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.

Estd.



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Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 206	INTRODUCTION TO OPERATING SYSTEMS	3-1-0-4	2016
Course Objectives This course aims to give a clear understanding of the classical internal algorithms and structures of operating systems including CPU scheduling, memory management and device management.			
Syllabus Introduction to Operating Systems, Process & Processor scheduling, Process Synchronization & Communication, Deadlocks, Memory Management, Virtual Memory, Device Management, File Management.			
Expected Outcome At the end of the course, students would be able to: <ul style="list-style-type: none"> • Gain extensive knowledge on principles and modules of operating systems; • Understand key mechanisms in design of operating systems modules; 			
References <ol style="list-style-type: none"> 1. Abraham Silberschatz and Peter Baer Galvin, Greg Gange, “Operating System Concepts”, Sixth Edition, Wiley - India. 2. Andrew S. Tanenbaum, “Modern Operating System”, Prentice Hall India. 3. Milan Milenkovic, “Operating systems”, TATA Mc GrawHill. 			
MOOC References <ul style="list-style-type: none"> • http://nptel.ac.in/courses/106106144/24 • http://www.studytonight.com/operating-system/classical-synchronization-problems 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Introduction to Operating System: OS Definition, Functions, types of OS - Batch Operating System, Multi programming, Time sharing, Real time, Distributed operating systems. Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls. [Ref 1]	9	15%
II	Process & Processor scheduling: Basic Concepts, process state transition diagram, PCB (Process control block), Threads, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling. [Ref 1]	9	15%
FIRST INTERNAL EXAMINATION			
III	Process Synchronization & Communication: Cooperating Process, Critical Section Problem, Semaphores. Deadlocks: Definition – Deadlock characterization, Resource allocation graph, methods for handling deadlocks, deadlock prevention, deadlock avoidance-safe state, Resource Allocation Graph Algorithm- Banker’s Algorithm, Deadlock Detection, Recovery From Deadlock. [Ref 1]	10	20%
IV	Memory Management: Preliminaries-Address Binding, Dynamic Linking and Loading. Swapping, Contiguous memory allocation, Paging, Page table structure, Segmentation, Segmentation with paging. [Ref 1]	10	20%
V	Virtual Memory: Demand paging, Page replacement-page replacement algorithms. Thrashing – Cause of thrashing. Device Management: Disk scheduling-FCFS-SSTF, SCAN, C-Scan, LOOK, Disk management, Disk reliability – RAID Structure. [Ref 1]	10	15%
SECOND INTERNAL EXAMINATION			
VI	File Management: File Concept, File Attributes, File Operations, File Types. Directories-Flat directory systems, Hierarchical Directory	8	15%

	Systems. Allocation Methods - Contiguous Allocation, Linked Allocation, Indexed allocation. [Ref 1]		
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p> <p>The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.</p>			



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 208	ELEMENTS OF BUSINESS MANAGEMENT	3-1-0-4	2016
<p>Course Objectives</p> <p>This course aims to develop ability to critically analyze and evaluate a variety of management practices to understand and apply organizational theories in practice.</p>			
<p>Syllabus</p> <p>Definition, functions of a management, managerial skills and roles, basics of decision making process. Early contributors and their contributions to the field of management. Different forms of business organization. Planning, Organizing, HRD functions, Directing and Controlling forms the core content of this course.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be able to:</p> <ul style="list-style-type: none"> • understand management as a process; • critically analyze and evaluate management theories and practices; • plan and make decisions for organizations; • do staffing and related HRD functions; • do control functions; 			
<p>References</p> <ol style="list-style-type: none"> 1. L. M. Prasad, “Principles of Management”, Sultan Chand Publications. 2. Peter F. Drucker, “The Practice of Management”, McGraw Hill, New York. 3. Philip Kotler and Keller, “Marketing Management”, Fifteenth Edition, Pearson Education. 4. R. N. Gupta, “Principles of Management”, S. Chand Company Ltd. 5. Robbins and Coulter, “Management”, Thirteenth Edition, Pearson Education, 2016. 			
<p>MOOC References</p> <ul style="list-style-type: none"> • http://nptel.ac.in/courses/122108038/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Introduction to Management: Basic Managerial Concepts, Levels of management, Managerial Skills, Managerial roles. Decision Making- Concept, types of decision, decision making process. Management functions- Planning, Organizing, Staffing, Directing and Controlling. [Ref 1]	8	15%
II	Early Contributions in Management: Management thought – Classical approach, scientific management, contributions of Taylor, Fayol's 14 principles of management, Human relation approach - contribution of Elton Mayo Systems approach – organization as an open system. [Ref 1]	8	15%
FIRST INTERNAL EXAMINATION			
III	Planning: Nature and importance of planning, types of plans, Steps in planning, Levels of planning – The Planning Process. MBO definition and process SWOT Analysis, importance. Organizing: Nature of organizing, Departmentation - need and importance, span of control in management, factors affecting span of management. Delegation of authority organization structure, Formal and informal, Types of organization structure line, line and staff, functional, divisional, project, matrix, free form, virtual. [Ref 1]	12	20%
IV	Staffing and related HRD Functions: meaning, nature, staffing process, Job analysis and manpower planning, job description and job specification. Recruitment & selection: concept of recruitment and selection, selection process, tests and interviews. [Ref 1]	8	15%
V	Directing and Controlling: Supervision, Motivation – significance, motivational theories- Maslow's need hierarchy, McGregor's Theory X & Theory Y, Basic control process- control as a feedback system. Feed Forward Control – Requirements for effective control, control techniques. [Ref 1]	8	15%
SECOND INTERNAL EXAMINATION			

VI	Marketing Management: importance, scope. Core Marketing Concepts, Marketing research, Customer value, Customer relationship management, Brand Equity, Product Life Cycle, Pricing Strategies, Distribution Channels, Promotions – Sales promotions, advertising and public relations. [Ref 3]	12	20%
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END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 212	INTERNET CONCEPTS AND WEB DESIGN	3-1-0-4	2016
Course Objectives This course aims to give understanding about the internet concepts and web designing along with practical knowledge.			
Syllabus Internet Basics, Internet Connectivity, Internet Applications, World Wide Web, HTML, JavaScript.			
Expected Outcome At the end of the course, students would be able to: <ul style="list-style-type: none"> • understand the internet concept and web designing process; • understand the design concepts and several testing methodologies; 			
References <ol style="list-style-type: none"> 1. Behrouz A. Forouzan, “Data Communications and Networking”, Fourth Edition, Tata McGraw Hill. 2. Harvey Deitel and Abbey Deitel, “Internet and World Wide Web – How to program”, Fifth Edition, Pearson Education. 3. Jennifer Niederst Robbins, “A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics”, Fourth Edition. 4. Steven Holzner, “HTML 5 Black Book”, Dreamtech Publishers. 5. Thomas A. Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third edition, Tata McGraw Hills. 6. William Stallings, “Data and computer communications”, Seventh Edition, PHI. 			
MOOC References <ul style="list-style-type: none"> • http://php.net/manual/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Networking Concepts: Simplified network model, Classification of networks -LAN, MAN, WAN and the Internet, Protocols and protocol architecture, The OSI ref. Model, TCP/IP ref. model, its origin, the Internet layer, the TCP layer, the application layer, Comparison of the OSI and TCP/IP ref. models. [Ref 1,6]	9	15%
II	Domain Naming System: Registering Domain name, URL, protocols, Server name, Port, Socket address, Relative URLs- overview of web browsers. Internet Service Providers, Internet Services Protocols concepts. Introduction to WWW, HTTP/HTTPS, FTP, SMTP, POP3 (Brief Treatment). [Ref 1,6]	9	15%
FIRST INTERNAL EXAMINATION			
III	Introduction to HTML (HTML5) - Elementary tags in HTML, List in HTML, Displaying Text in Lists - Using Ordered List, Using Unordered Lists. [Ref 4]	10	20%
IV	HTML- fonts, Graphics and Image Formats, HTML hyperlink, Tables, Frames, Forms, Background Graphics and Color. [Ref 3,4]	10	20%
V	Cascading style sheets, Defining styles, Properties & values in styles, Style sheets: Formatting blocks of information. [Ref 3,5]	10	15%
SECOND INTERNAL EXAMINATION			
VI	Java script: Introduction to Java script, Basics, Variables, String manipulation, Mathematical Functions, Operations, Arrays, Functions, Objects in Java script- regular expressions. [Ref 3,5]	8	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p>			

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 232	VISUAL PROGRAMMING LAB	0-0-6-1	2016
Course Objectives The aim of the course is to give students basic information about the visual programming concepts using .NET library, and to enable them to design and code visual programs.			
Syllabus Event driven programming, How to start with a project, Introduction of various windows, Variables, Data Types, Arrays, Constants, Control Statements, Procedures, Subroutines, Controls, Database Management, ADO, Visual Data Manager, Database Connectivity.			
Expected Outcome At the end of the course, students would be able to <ul style="list-style-type: none"> • understand visual programming concepts; • understand the need for a professional approach to design and deploy programs with good documentation; 			
References <ol style="list-style-type: none"> 1. C. Komalavalli, Sanjib K Sahu, “Essentials of .Net Programming Theory and Application”, Ane Books Pvt. Ltd, 2016. 2. Clayton E. Crooks, “Learning Visual Basic.NET Through Applications”, First Edition, Hingham, Mass: Charles River Media, C2003. 3. Shirish Chavan, “Visual Basic .NET”, First Edition, Pearson Educations, 2004. 4. Steven Holzner, “Visual Basic .NET Programming. Black Book”, New Edition, Dreamtech Press, 2005. 			
MOOC References <ul style="list-style-type: none"> • http://www.nptelvideos.com/visualbasic_net/visualbasicnet_video_tutorials.php • http://www.slideshare.net/somgaj/visual-programming-lab • https://www.lynda.com/Kodu-tutorials/Learning-Visual-Programming-Kodu/176499-2.html • http://www.sourcecodesolutions.in/2010/09/cs1255-visual-programming-lab.html 			

Experiments	Contents
I	Event driven programming: Concept of GUI, Various VB- Editions, how to start with a project, Introduction of various windows: Properties of Windows, Project Windows, Toolbox Windows, Menubar, Windows. [Ref 1,4]
II	Variables and constants: data types, declaration, Operators, types precedence, Expressions. Program flow-Decision statements –if... Then, if... Then... else, select...case Loop statements –while... end while, do .loop, for...next, for...each... next. [Ref 1,4]
III	Value data types: Structures, Enumerations. Reference data types, Single dimensional, Multidimensional arrays. Windows programming: Creating windows Forms, windows controls -Button, Check box, Combo box, Label, List box, Radio Button, Text box. Events – Click, close, Deactivate, Load, Mouse move, Mouse down, and Mouse Up.
IV	Menus and Dialog Boxes: Creating menus, menu items, context menu, Using dialog boxes, showDialog () method. [Ref 1,4]
V	Scroll bars & slider controls, Timer, File. Web Controls - HTML Controls and Selecting Controls for Applications, Adding web controls to a Page. [Ref 1,4]
VI	Connecting to Data Source, Accessing Data with Data set and Data Reader. Database Connectivity with controls, ADO, Establishing connection, Executing SQL statements. [Ref 1,4]

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 234	STATISTICS LAB	0-0-4-1	2016
Course Objectives <ul style="list-style-type: none"> To introduce modern statistical tools To prepare students for big data analysis course 			
Syllabus This is a companion course for the INMCA203- Probability and Statistics & INMCA204- Applied Statistics.			
Expected Outcome <ul style="list-style-type: none"> Students will be able to apply statistical methods to real life problems 			
References Web Resources PSPP 1. www.gnu.org/s/pspp/manual/pspp.pdf Simple R 2. http://www.math.csi.cuny.edu/Statistics/R/simpleR/			
MOOC References: <ul style="list-style-type: none"> https://www.edx.org/course/analyzing-visualizing-data-excel-microsoft-dat206x-1 https://www.coursera.org/learn/analytics-excel Instructors can also used the simulations material at <ul style="list-style-type: none"> http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials 			

Experiments	Description
I	<p>Visualizing Data</p> <p>Tables, charts and plots. Visualising Measures of Central Tendency, Variation, and Shape. Box plots, Pareto diagrams. How to find the mean, median, standard deviation and quantiles of a set of observations.</p> <p>Students may experiment with real as well as artificial data sets.</p>
II	<p>Probability Distributions.</p> <p>Set operations, simulation of various properties. Bays' rule. Generate and Visualize Discrete and continuous distributions using the statistical environment. Demonstration of CDF and PDF uniform and normal, binomial Poisson distributions. Students are expected to generate artificial data using the chosen statistical environment and explore various distribution and its properties. Various parameter changes may be studied.</p>
III	<p>Random samples.</p> <p>How to generate random numbers. Study how to select a random sample with replacement from normal and uniform distribution. Students can use the built in functions to explore random sample selection.</p>
IV	<p>Study of binomial distribution. Plots of density and distribution functions. Normal approximation to the Binomial distribution. Central limit theorem.</p>
V	<p>Study of confidence intervals. How to compute confidence intervals for the mean when the standard deviation is known.</p>
VI	<p>How to perform tests of hypotheses about the mean when the variance is known. How to compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value.</p>
VII	<p>How to find quantiles of the t-distribution. How to perform a significance test for testing the mean of a population with unknown standard deviation.</p>
VIII	<p>Compare populations means from two Normal distributions with unknown variance</p> <p>Tests of Hypotheses for One Proportion</p> <p>Tests of Hypotheses for Comparing Two Proportions</p>
IX	<p>How to calculate the correlation between two variables. How to make scatter plots. Use the scatterplot to investigate the relationship between two variables</p>

X	Find the least-squares regression line. How to calculate and plot the residuals.
	<p><i>Note : This laboratory is to be conducted with a suitable statistical software. The colleges can choose the statistical software. Some of the suggested environments are R, SciPy, SPSS Excel, or any other statistical analysis software depending on availability.</i></p> <p><i>The students are expected to write code for statistical applications using the chosen environment. The instructor may choose a standard data set and ask the students to work with it.</i></p>
*End Semester Examination will be conducted internally by the College.	

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