

## M.Sc. (I.C.T.) 2<sup>nd</sup> Semester

### Course : 201 : Blockchain Computing

Course Code	ICT 201																								
Course Title	Blockchain Computing																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	To learn the concepts of Blockchain, cryptocurrencies and smart contracts.																								
Course Objective	To introduce the comprehensive concepts of Blockchain and its transactions. At the end of this course, a student will be able to comprehend the fundamental concepts required for usage of Blockchain.																								
Course Outcomes	CO1 : Students will be able to learn technical foundations of Blockchain technology CO2 : Students will be able to understand bitcoin, ethereum cryptocurrency and the transactions CO3 : Students will be able to understand the concepts of Smart Contracts and NFT																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basics of ISA and Java																								

Course Content	<p><b>Unit 1. Introduction to Blockchain</b></p> <p>1.1 Understanding Blockchain 1.2 The growth of Blockchain Technology 1.3 Distributed systems 1.4 History of Blockchain 1.5 Common Misconceptions 1.6 Cryptographic hash 1.7 Digital Signature 1.8 Merkle Tree</p> <p><b>Unit 2. Building Blockchain</b></p> <p>2.1 Essentials of Blockchain 2.2 Blockchain architecture 2.3 Generic elements of a Blockchain 2.4 Types of Blockchain 2.5 Consensus</p>
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- 2.5.1 Byzantine Fault
- 2.5.2 Proof of Work
- 2.5.3 Proof of Stake
- 2.5.4 Double-spending
- 2.6 Creating blocks and links
- 2.7 Inserting Hashes
- 2.8 Forking in block chain

### **Unit 3. Smart contract based Blockchains – A case of Ethereum Blockchain**

- 3.1 Overview of Ethereum
- 3.2 Ethereum network
- 3.3 Ethereum structure
- 3.4 Proof of Stake
- 3.5 Smart contracts
- 3.6 Ether and gas points
- 3.7 Ethereum operations
- 3.8 Ethereum wallets
- 3.9 Mining Ether
- 3.10 Decentralized Autonomous Organization (DAO) and Decentralized Finance
- 3.11 Creating Smart Contracts using Solidity

### **Unit 4. Web 3.0 and Hyperledger**

- 4.1 Introduction to Web 3.0
  - 4.1.1 Development Frameworks
  - 4.1.2 Decentralize Applications (DApps)
- 4.2 Hyperledger as a Protocol
  - 4.2.1 Reference Architecture
  - 4.2.2 Hyperledger Fabric
  - 4.2.3 Distributed Ledger

### **Unit 5. NFT (Non Fungible Tokens) and Other Use Cases of Blockchain**

- 5.1 NFT
  - 5.1.1 Introduction to NFT
  - 5.1.2 Difference between NFT and cryptocurrency
  - 5.1.3 Types of NFT
  - 5.1.4 Creating, buying and selling NFT
  - 5.1.5 Impact of NFT on environment
  - 5.1.6 NFT Usage and Rights
  - 5.1.7 Innovative and popular NFT
- 5.2 Use Cases
  - 5.2.1 Financial technology

*P. V. Desai*

	5.2.2 Real Estate 5.2.3 Insurance 5.2.4 Governance 5.2.5 Other industries
Reference Books	1. Mastering Blockchain, Imran Bashir, Packt Publisher 2. Blockchain for dummies, Tiana laurence, Wiley 3. Bitcoin and Cryptocurrency Technologies: Arvind narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton university press 4. Blockchain Applications: A Hands-On Approach , Arshdeep Bahga ,Vijay Madiseti - VPT 5. Metaverse For Beginners 2022 The Ultimate Guide on -Investing In Metaverse, Blockchain Gaming, Virtual Lands, Augmented Reality, Virtual Reality, NFT, Real Estate, Crypto And Web 3.0, Justin Sonnen 6. Mastering Ethereum Building Smart Contracts and DApps, Andreas Antonopoulos, Gavin Wood, O'Reilly 7. Mastering BitCoin 2/ED programming the open blockchain, Andreas M. Antonopoulos, O'Reilly 8. The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, Elad Elrom, Apress 9. Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly 10. Blockchain: The Blockchain For Beginners Guide To Blockchain Technology And Leveraging Blockchain Programming, Josh Thompsons 11. The NFT Handbook: How to Create, Sell and Buy Non-Fungible Tokens, QuHarrison Terry, Matt Fortnow, Wiley
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	30% Internal assessment 70% External assessment
Tools	1. Solidity Compiler 2. Tools and libraries 3. Remix 4. Local test node : Pythereum, Ganache 5. Code Analysers: Solium, Open Zeppelin 6. Browsers: Mist, Metamask

*P. V. Dasari*

## M.Sc. (I.C.T.) 2<sup>nd</sup> Semester

### Course : ICT 202 : Application Development using .NET Core

Course Code	ICT 202																												
Course Title	Application Development using .NET Core																												
Credit	4																												
Teaching per Week	4 Hrs																												
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																												
Last Review / Revision	June 2023																												
Purpose of Course	This course helps students to understand and use .NET advanced concepts for real world .NET applications.																												
Course Objective	To impart knowledge of Enterprise application development using .NET Core.																												
Course Outcome	<p>CO1: Students will be able to understand and learn object-oriented concepts using C#.NET Core and web application development using ASP.NET Core MVC architecture.</p> <p>CO2: Students will be able to learn and develop RESTful web services and web API using .NET Core.</p> <p>CO3: Students will be able to learn and implement LINQ and database integration using C#.</p>																												
Mapping between COs with PSOs	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO2</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO3</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
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CO1																													
CO2																													
CO3																													
Pre-requisite	Object Oriented Fundamental, ADO.NET, Basic Web Development Concepts.																												
Course Content	<p><b>Unit : 1 : Introduction to .NET Core and C#</b></p> <p>1.1. .NET Framework</p> <p>1.1.1 .NET Framework architecture</p> <p>1.1.2 Common Language Runtime</p> <p>1.1.3 Common Type System</p> <p>1.1.4 Common Language Specification</p> <p>1.1.5 Microsoft Intermediate Language</p> <p>1.1.6 Framework Class Libraries</p> <p>1.2. .NET Core</p> <p>1.2.1 .NET Core Architecture</p> <p>1.2.2 Difference between .NET Core and .NET Framework</p> <p>1.2.3 Advantages of .NET Core</p> <p>1.3. Assemblies and Namespaces</p> <p>1.4. Overview of C#.Net CORE</p> <p>1.5. .NET CORE Assemblies and Libraries</p> <p>1.6. Data Types</p> <p>1.7. Variables and Constants</p> <p>1.8. Operators</p> <p>1.9. Flow Control</p> <p>1.10. Program Structure</p> <p>1.11. Application Configuration</p> <p><b>Unit : 2 : Programming using C# .NET Core</b></p>																												

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- 2.1. Classes and Structure
- 2.2. Construction and Disposal of object
- 2.3. Inheritance
- 2.4. Method Overloading
- 2.5. Operator Overloading
- 2.6. Interfaces
- 2.7. Exception & Error Handling
- 2.8. Threads and AppDomains
- 2.9. Delegates
- 2.10. Events
- 2.11. Reflection
- 2.12. Serialization
- 2.13. Attributes and Annotations
- 2.14. Pattern Matching
- 2.15. Tuples and Deconstruction
- 2.16. Local/Nested Functions
- 2.17. Expression Bodied Members

**Unit : 3 : Collections and LINQ**

- 3.1. Collections
- 3.2. Indexers
- 3.3. Generics
- 3.4. LINQ Language Features
- 3.5. Object Initialization
- 3.6. Anonymous Types
- 3.7. Implicitly Typed Local Variables
- 3.8. Lambda Expression
- 3.9. Query Expression
- 3.10. LINQ to Objects
- 3.11. LINQ to XML
- 3.12. LINQ to SQL
- 3.13. LINQ to Entities

**Unit : 4 : ASP.NET CORE MVC**

- 4.1. Introduction to ASP.NET Core
- 4.2. Multiple Environments and Development Mode
- 4.3. MVC Architectural Pattern
- 4.4. URL Routing Engine
- 4.5. Routing Configuration
- 4.6. Wiring Controller, Model, and View
- 4.7. Data Access and Modeling
- 4.8. TempData, ViewBag and ViewData
- 4.9. NuGet Package
- 4.10. Dependency Injection
- 4.11. Asynchronous Programming
- 4.12. Action Filters
- 4.13. Security and Identity
- 4.14. Unit Testing and ASP.NET MVC
- 4.15. Self hosting of Web Applications
- 4.16. Working with SQL and No-SQL Data Storage Types

**Unit : 5 : RESTful Services**

- 5.1 Introduction to Web Services
- 5.2 RESTful API
- 5.3 Working with .NET Application

*P. V. Desai*

	5.4 Working with RESTful Services 5.5 Testing and Consuming Web API 5.6 Configuring Web API for Cross-Platform
Reference Book	<ol style="list-style-type: none"> <li>1. C# The Basics by Vijay Mukhi : BPB</li> <li>2. C# Essentials by Ben Albahari : O'Reilly</li> <li>3. Professional C# by Simon Robinson : Wrox</li> <li>4. LINQ Pocket Reference: Learn and Implement LINQ for .NET Applications by Joseph Albahari, Ben Albahari, O'Reilly</li> <li>5. Learning ASP.NET Core MVC Programming by Mugilan T. S. Ragupathi, Packt Publishing Ltd</li> <li>6. Enterprise Application Architecture with .NET Core by Ganesan Senthilvel, Ovais Mehboob Ahmed Khan, Habib Ahmed Qureshi, Packt Publishing Ltd.</li> <li>7. ASP.NET MVC with Entity Framework and CSS by Lee Naylor, APress</li> <li>8. Pro ASP.NET Core MVC by Adam Freeman, Springer</li> <li>9. Learning ASP.NET Core MVC Programming by Mugilan T. S. Ragupathi, Packt Publishing Ltd</li> <li>10. Murach's ASP.NET Core MVC by Mary Delamater, Joel Murach, Mike Murach &amp; Associates, Inc</li> </ol>
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

*P. V. Dhanu*

**M. Sc. (I.C.T.) 2<sup>nd</sup> Semester**

**Course: ICT 203 Elective 1: Smart Device Computing Using iOS**

Course Code	ICT 203 Elective 1																												
Course Title	Smart Device Computing Using iOS																												
Credit	4																												
Teaching per Week	4 Hrs																												
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																												
Last Review / Revision	June 2023																												
Purpose of Course	The Purpose of course is to help understanding the components and structure of mobile application development using iOS. The course also provides students with the skills necessary to develop an iOS App from scratch to deploying it on the Apple Store.																												
Course Objective	The objective of the course is to impart knowledge of Swift and Apple iOS application Design and Development.																												
Course Outcomes	CO1 : Students will be able to understand Apple based smart device application development CO2 : Students will be able to learn about various components of iOS application development tools CO3 : Students will be able to publish iOS application on Apple store.																												
Mapping between COs with PSOs	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
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CO1																													
CO2																													
CO3																													
Pre-requisite	Object Oriented Programming knowledge.																												
Course Content	<p><b>Unit 1 : Introduction to iOS with Swift Language</b></p> <ol style="list-style-type: none"> <li>1.1. Introduction iOS and iOS Architecture <ol style="list-style-type: none"> <li>1.1.1. Foundation Framework</li> <li>1.1.2. Cocoa Framework</li> </ol> </li> <li>1.2. Introduction to Xcode IDE <ol style="list-style-type: none"> <li>1.2.1. Setting up Development Environment</li> <li>1.2.2. Xcode Development Tools – Interface Builder and Simulator</li> <li>1.2.3. Testing and Debugging</li> </ol> </li> <li>1.3. Introduction to Swift <ol style="list-style-type: none"> <li>1.3.1. Datatypes, Variables in Swift</li> <li>1.3.2. Tuples, Constants, Literals in Swift</li> <li>1.3.3. Working with Strings in Swift</li> </ol> </li> <li>1.4. Optionals in Swift - Implicit and Explicit</li> <li>1.5. Collections in Swift <ol style="list-style-type: none"> <li>1.5.1. Dictionaries, Arrays, and Sets</li> </ol> </li> <li>1.6. Control Flows and Functions in Swift</li> <li>1.7. Object Oriented Programming in Swift <ol style="list-style-type: none"> <li>1.7.1. Custom Class and Instance Creation</li> <li>1.7.2. Inheritance and Polymorphism</li> <li>1.7.3. Initializers in swift</li> </ol> </li> <li>1.8. Protocols and Extensions</li> <li>1.9. Information Property List File and App Permissions</li> </ol> <p><b>Unit 2 : iOS Design Patterns</b></p> <ol style="list-style-type: none"> <li>2.1 Introduction to Storyboard</li> <li>2.2 Introduction to UIView, UIWindow and UIViewController</li> <li>2.3 Model View Controller (MVC) Pattern in Interface Design</li> <li>2.4 Application Life Cycle and View Controller Life Cycle</li> <li>2.5 Storyboard and Interface builder</li> <li>2.6 Working with Basic UIElements <ol style="list-style-type: none"> <li>2.6.1 UILabel, UIButton, UITextFeild, UIImageView etc.</li> </ol> </li> <li>2.7 IBActions and IBOutlets</li> </ol>																												

*P. J. Desai*

	<p>2.8 Auto Layout Constraints to create Adaptive UI</p> <p>2.9 UIAnimation</p> <p>2.9.1 Animation using Auto Layout Constraints</p> <p>2.9.2 Animation with UIImageView</p> <p>2.10 Recognizing and Handling Gestures</p> <p>2.10.1 Working with different types of Gestures</p> <p>2.10.2 Gestures with UIElements</p> <p><b>Unit 3 : UIControls in iOS</b></p> <p>3.1 Navigation Controller and its Usage</p> <p>3.2 Navigation Techniques</p> <p>3.2.1 Segue, Push, Pop, Present and Dismiss</p> <p>3.3 Working with TableView</p> <p>3.3.1 Static TableViewController</p> <p>3.3.2 Dynamic TableView</p> <p>3.4 Working with UIPickerView</p> <p>3.5 Working with Miscellaneous Controls in iOS</p> <p>3.5.1 UICollectionView</p> <p>3.5.2 UITabBarController</p> <p>3.5.3 UIScrollView</p> <p>3.5.4 UIWebView</p> <p>3.5.5 ContainerView</p> <p>3.6 Working with alertController and its Types</p> <p><b>Unit 4 : Data Persistence and Data Manipulation Techniques</b></p> <p>4.1 Working with UserDefaults for data persistence</p> <p>4.2 Introduction to FileManager</p> <p>4.3 Frameworks and Library Configurations</p> <p>4.4 Data Persistence Techniques</p> <p>4.4.1 SQLite Framework</p> <p>4.4.2 Core Data Framework</p> <p>4.5 Data Manipulation Techniques</p> <p>4.5.1 JSON Parsing</p> <p>4.5.2 XML Parsing</p> <p><b>Unit 5 : Advance Programming in iOS</b></p> <p>5.1 API intergation</p> <p>5.2 Location based Services</p> <p>5.1.1. Core Location Services</p> <p>5.1.2. CLLocation and CLLocationManager Classes</p> <p>5.1.3. MapKit, MapView and MKPointAnnotation</p> <p>5.1.4. Location Based Call-outs</p> <p>5.3 Introduction to the working of Push Notifications</p> <p>5.4 Publishing iOS App to Apple Store</p> <p>5.5 Introduction to CoreML</p> <p>5.6 Introduction to SwiftUI</p>
Reference Book:	<ol style="list-style-type: none"> <li>1. Swift Programming: The Big Nerd Ranch Guide (2nd Edition) (Big Nerd Ranch Guides) 2nd Edition by Matthew Mathias (Author), John Gallagher (Author)</li> <li>2. Swift: A Comprehensive Intermediate Guide to Learn and Master the Concept of Swift Programming Kindle Edition by MG Martin (Author)</li> <li>3. iOS 12 Programming Fundamentals with Swift: Swift, Xcode, and Cocoa Basics 1st Edition by Matt Neuburg (Author)</li> <li>4. Classic Computer Science Problems in Swift: Essential Techniques for Practicing Programmers 1st Edition by David Kopec</li> <li>5. iOS Programming: The Big Nerd Ranch Guide, by Christian Keur and Aaron Hillegass</li> <li>6. Beginning Swift by Rob kerr and Kare Morstol, Packt Publication</li> </ol>
Teaching Methodology:	Lectures, Discussion, Independent Study, Hands-on-Session, Seminars and Assignment
Evaluation Method:	30% Internal assessment 70% External assessment

*P. V. Vasu*



**M.Sc. (I.C.T.) 2<sup>nd</sup> Semester**

**Course : ICT 203 : Smart Device Computing Using Android**

Course Code	ICT 203 Elective 2																								
Course Title	Smart Device Computing Using Android																								
Credit	4																								
Teaching per Week	4 Hrs																								
Last Review / Revision	June 2023																								
Purpose of Course	This course helps students to understand android based smart device application development. The course also gives students an idea about various components of Android application development tools.																								
Course Objective	The objective of the course is to provide a thorough introduction to the Android environment, Tools for creating Android applications, The Android approach to structuring applications, Basic user interfaces, and Application life cycles.																								
Course Outcomes	CO1 : Students will be able to understand android based smart device application development CO2 : Students will be able to learn about various components of Android application development tools CO3 : Students will be able to publish Android application on Google play store.																								
Mapping between COs with PSOs	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
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CO1																									
CO2																									
CO3																									
Pre-requisite	Object Oriented Programming knowledge																								
Course Content	<p><b>Unit : 1 : Introduction to Kotlin</b></p> <p>1.1 Kotlin Overview 1.2 Environment setup in Android Studio 1.3 Variables, Data types, Arrays, Array list in Kotlin 1.4 Operators in Kotlin 1.5 Control flow statements in Kotlin 1.6 Loops in Kotlin 1.7 Functions and Lambda expressions in Kotlin 1.8 Object Oriented Programming in Kotlin</p> <p><b>Unit : 2 : Android Application development</b></p> <p>2.1 Android Application architecture 2.2 AVD, Gradle, Manifest, Resources 2.3 Android Activity and Activity lifecycle 2.4 Android Views and Layouts 2.5 Button, TextView, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, Spinner, etc... 2.6 Event Handling in Kotlin 2.7 AutoCompleteTextView View 2.8 User Interactions - Toast, Dialog, Menus - Types of Menus 2.9 List &amp; Views( RecyclerView, Card View, etc...) 2.10 Intents&amp; Intent Life Cycle - Types of Intents 2.11 Navigation between screens 2.12 Tabs and Fragments</p>																								

*P. V. [Signature]*

	<p><b>Unit : 3 : Working with Data and Background Services</b></p> <p>3.1 Shared preferences  3.2 Internal and External storage  3.3 Android Database Design considerations  3.4 Working with SQLite database  3.5 CRUD operations on SQLite  3.6 Working with Firebase - CRUD operations  3.7 Content Provider  3.8 Background Services and its Life cycle  3.9 Working with multi-threading and AsyncTask  3.10 Broadcast Receivers</p> <p><b>Unit : 4 : Working with Google Play Services and API</b></p> <p>4.1 Location Navigation  4.2 Geocoding and Reverse Geocoding Notifications  4.3 Working with Google Maps API  4.4 Working with Rest API and Retrofit Library  4.5 Working with web Services  4.6 Google Cloud messaging</p> <p><b>Unit : 5 : Advanced Android Programming</b></p> <p>5.1 Android property animations  5.2 Push notification with Firebase  5.3 API integration  5.4 Cloud storage with Firebase  5.5 XML and JSON Parsing  5.6 Working with Coroutines  5.7 Testing and Debugging Android Application  5.8 Publishing Apps  5.9 Introduction to Material design</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Android Programming with Kotlin for Beginners, by John Horton, Packt publication 2019</li> <li>2. Learn Kotlin for Android Development by Peter Spath, Apress publication, 2019</li> <li>3. Head First Kotlin - a brain friendly guide by Dawn Griffiths and David Griffiths, O'Reilly publication 2019</li> <li>4. Learn Android Studio 3 with Kotlin by Ted Hagos, Apress publication, 2018</li> <li>5. Kotlin In-Depth by Aleksei Sedunov, BPB publications, 2020</li> <li>6. Mastering Kotlin by Nate Ebel, Packt publication 2019</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

*P. V. Deivan*

## M.Sc. (I.C.T.) 2<sup>nd</sup> Semester

### Course: 204: Digital Communication

Course Code	204					
Course Title	Digital Communication					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)					
Effective From	June 2023					
Purpose of Course	This course provides in depth knowledge of mobile communication architecture and wireless communication technologies.					
Course Objective	To make student understand Mobile technology architecture, its components and Wireless communication technology.					
Course Outcomes	<p>CO1 : Students will be able to understand data, signals and transmission media.</p> <p>CO2 : Students will be able to analyze various transmission media, data encoding, modulation and multiplexing techniques.</p> <p>CO3 : To impart knowledge about cellular communication, wireless enterprise and new generation mobile services.</p>					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Fundamental knowledge of network communication					
Course Outcome	This course enables students to understand mobile communication. This course will also help students to understand the role of various wireless communication systems and select particular type of communication technology for their application development.					

*P. M. Datta*

Course Content	<p>Unit : 1 : Introduction of communication system</p> <p>1.1 Introduction of Electronic communication System</p> <p>1.2 wave property and characteristics.</p> <p>1.3 electromagnetic spectrum, bandwidth and information capacity</p> <p>1.4 signal analysis</p> <p>1.5 introduction of sensor, Analog to digital conversion and digital to analog conversion</p> <p>1.6 Pulse code modulation(PCM)</p> <p>1.7 digital modulation and transmission techniques(ASK,FSK,PSK)</p> <p>Unit : 2 : multiplexing techniques and Network switching</p> <p>2.1 FDMA</p> <p>2.2 TDMA</p> <p>2.3 WDM</p> <p>2.4 circuit and data(Packet) mode, circuit switching, packet switching</p> <p>2.5 introduction of transmission media</p> <p>Unit : 3 : Cellular communication systems</p> <p>3.1 Mobility, Mobile and Ubiquitous computing</p> <p>3.2 Global System for Mobile Communication (GSM) system overview:</p> <p>    3.2.1 Cellular concept</p> <p>    3.2.2 GSM Architecture</p> <p>    3.2.3 Frequency Reuse Planning and Design</p> <p>    3.2.4 Mobility Management(Hard Handoff)</p> <p>3.3 General Packet Radio Service (GPRS) architecture and working</p> <p>3.4 Wireless Local Loop (WLL)</p> <p>3.5 introduction of 3G technology</p> <p>    3.5.1 introduction of CDMA</p> <p>    3.5.2 Frequency Allocation</p> <p>    3.5.3 Soft Handoff</p> <p>3.6 Introduction of satellite communication</p> <p>Unit : 4 : Wireless Enterprise networks</p> <p>4.1 Bluetooth technology</p> <p>4.2 RFID technology</p> <p>4.3 Mobile IP</p> <p>4.4 Infrared communication technology</p> <p>4.5 Wireless sensor networks</p> <p>4.6 WIFI, WIMAX Technology</p> <p>Unit : 5 : New Generation Mobile Services</p> <p>5.1 Introduction to 4G technology</p> <p>5.2 Introduction to 5G technology</p> <p>5.3 introduction of Internet of Things.</p> <p>5.4 IoT/M2M Applications</p>
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*P. V. Dasan*

Reference Book	<ol style="list-style-type: none"> <li>1. 5G Mobile Core Network, Rajaneesh Shetty, Apress publication</li> <li>2. Industry 4.0 the industrial internet of things, Alasdair Gilchrist, Apress publication</li> <li>3. Introduction to Wireless and Mobile System, Darma Prakash agrawal, Qing-An Zeng, Cengage Publication</li> <li>4. Mobile Computing, Asokek Talukder, Hasan Ahmed, Roopa Yavagal, MC Graw Hill Publication</li> <li>5. Embedded systems- concepts, Design and Programming, Parag Dave, Himanshu B. Dave, Pearson Publication</li> <li>6. Wireless And Mobile Communication, T.G.Palanivelu, PHI publication</li> <li>7. Mobile and Personal communication systems and services, Raj pandya, PHI</li> <li>8. Principles of Wireless Networks, Kavesh Pahlavan, Prashant Krishnamurti, Pearson Edition</li> <li>9. Wireless and Mobile Network Architectures, Yi-Bing Lin &amp; Imrich Chlamtac, John Wiley &amp; sons,</li> <li>10. Guide to Designing and Implementing Wireless LANs; Mark Ciampa, Thomson Learning Vikas Publishing house</li> <li>11. The Wireless Application Protocol Sandip singhal, Pearson edition</li> <li>12. Embedded real time system K.V.K.K. Prasad Dreamtech press</li> <li>13. Adhoc Wireless Networks C.Siva Ram Murthy, B.S.Manoj Pearson Education</li> <li>14. Data communication and Networking, Behrouza A forouzan, Mc Graw Hill publication</li> </ol>
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment</p> <p>70% External assessment</p>

*P. V. ...*

## M.Sc. (I.C.T.) 1<sup>st</sup> Semester

### Course : ICT 205 : Practical 3

Course Code	205																												
Course Title	Practical 3																												
Credit	3																												
Teaching Per Week	3 Hrs																												
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																												
Review/Revision	June 2023																												
Purpose of Course	The course provides practical knowledge of C#, LINQ, .NET Core and MVC.																												
Course Objective	The course prepares students to develop .NET Core based applications.																												
Course Outcomes	CO1 : Students will be able to develop applications using C#.NET core. CO2 : Students will be able to develop web applications using ASP.NET MVC core. CO3 : Students will be able to develop web applications using RESTful web API.																												
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																								
CO1																													
CO2																													
CO3																													
Prerequisite	Object Oriented Programming Concepts																												
Course Outcome	After completion of this course, students will be able to develop .NET Core based applications.																												
Course Content	Practical based on Paper No. 202 - Application Development using .NET Core.																												
Reference Books	NIL																												
Teaching Methodology	Lab Work																												
Evaluation Method	30% Internal Assessment 70% External Assessment																												

*P. V. [Signature]*

## M.Sc. (I.C.T.) 2<sup>nd</sup> Semester

### Course: 206: Practical 4

Course Code	206																												
Course Title	Practical 4																												
Credit	3																												
Teaching per Week	3 Hrs																												
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																												
Effective From	June 2023																												
Purpose of Course	The course provides practical knowledge of application development for smart devices using iOS or Android.																												
Course Objective	The course prepares students to develop applications for smart devices using iOS or Android.																												
Course Outcomes	<p><b>Elective 1</b></p> <p>CO1 : Students will be able to develop simple applications with playground tools in XCode.</p> <p>CO2 : Students will be able to develop GUI applications with XCode IDE.</p> <p>CO3 : Students will be able to develop location based services using various frameworks.</p> <p><b>Elective 2</b></p> <p>CO1 : Students will be able to develop android applications using the latest design concepts, controls and components.</p> <p>CO2 : Students will be able to develop applications using the local database-SQLite and integrate web services in android.</p> <p>CO3 : Students will be able to create applications using background services, location services, google maps, etc.</p>																												
Mapping between COs with PSOs	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																								
CO1																													
CO2																													
CO3																													
Pre-requisite	Basic Object Oriented Programming Concepts																												
Course Contents	Practical based on elective Paper No. 203 – (Elective I : Smart Device Computing Using iOS or Elective II : Smart Device Computing Using Android).																												
Reference Books	Nil																												
Teaching Methodology	Lab Work, Assignment																												
Evaluation Method	30 % Internal Assessment 70% External Assessment																												

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## M.Sc. (I.C.T.) 1<sup>st</sup> Semester

### Course : ICT 207 : Part Time Project 2

Course Code	207																								
Course Title	Part Time Project 2																								
Credit	3																								
Teaching Per Week	3 Hrs																								
Duration	-																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Review/Revision	June 2023																								
Purpose of Course	The project work is introduced to make students implement their theory and practical knowledge they learned during this semester to solve real life problems for software applications.																								
Course Objective	To help students to develop software applications using .NET, Mobile Technology and popular JavaScript based frameworks.																								
Course Outcomes	CO1 : Students will be able to develop project(s) using .NET technology and Mobile Technology. CO2 : Students will be able to apply Software Engineering concepts to solve real world problems. CO3 : Students will be able to apply database related concepts to design database for the project(s).																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Prerequisite	Knowledge of Object Oriented Programming, Web Technology Fundamentals, Software Engineering.																								
Course Content	<p>The students are required to develop project(s) using .NET, Mobile Technology and popular JavaScript based frameworks.</p> <p>The students must prepare documentation of the project completed as per the Software Engineering Guidelines.</p> <p>At the end of the semester, the students have to submit their project report in bounded form to the institution.</p> <p>The Project Presentation and Viva – Voce will be conducted as per the University exam schedule.</p> <p>The students have to submit the following reports at the institution:</p> <ol style="list-style-type: none"> <li>1. Project Joining Report</li> <li>2. Project Title Report</li> <li>3. Progress Report</li> <li>4. Project Completion Certificate</li> <li>5. Institution Certificate</li> <li>6. Non disclosure of Source Code Certificate (In case the student is unable to demonstrate project source code)</li> </ol>																								
Reference Books	NIL																								
Teaching Methodology	Project guidance, Review																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

*P. V. D. S. S.*