



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech Computer Science and Engineering-Mobile Applications-Apple Authorized Training Center

SEMESTER-VI (2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS601 N	DCC	Compiler Design	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks

Course Objectives:

- To introduce the major concept areas of language translation and compiler design
- To enrich the knowledge in various phases of compiler and its use
- To provide understanding of steps of programming necessary for constructing a compiler

Course Outcomes:

- Ability to apply the knowledge of lex tool & yacc tool to develop a scanner & parser
- Ability to design and develop software system for backend of the compiler
- Ability to comprehend and adapt to new tools and technologies in compiler design

Syllabus

Unit – I:

8 Hours

Introduction: Compiler, Compilers analysis of the source program, Phases of a compiler, Cousins of the Compiler, Grouping of Phases and Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering and Specification of Tokens.

Unit – II:

10 Hours

Syntax Analysis: Role of the parser, Writing Grammars, Context-Free Grammars, Top Down parsing, Recursive Descent Parsing, Predictive Parsing, Bottom-up parsing, Shift Reduce Parsing, Operator Precedent Parsing, LR Parsers, SLR Parser – Canonical LR Parser – LALR Parser.

Unit – III:

9 Hours

Intermediate Code Generation: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, Three Address code, Back patching, Procedure calls.

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Unit – IV:

10 Hours

Code Optimization and Run Time Environments: Introduction, Principal Sources of Optimization, Optimization of basic Blocks, DAG representation of Basic Blocks - Introduction to Global Data Flow Analysis, Runtime Environments, Source Language issues, Storage Organization, Storage Allocation strategies, Access to non-local names, Parameter Passing, Error detection and recovery.

Unit – V:

9 Hours

Code Generation: Issues in the design of code generator, The target machine, Runtime Storage management, Basic Blocks and Flow Graphs, Next-use Information, A simple Code generator, Peephole Optimization.

Text Books:

1. Alfred V. Aho, Jeffrey D Ullman, “Compilers: Principles, Techniques and Tools”, Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005
3. Dhamdhare, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

References:

1. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003
3. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001
4. Kenneth C. Loudon, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003

List of Experiments:

1. To study the Lex Tool.
2. To study the Yacc Tool.
3. Write a program to implement Lexical Analyzer to recognize few patterns of C.

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4. Write a program to implement the Recursive Descent Parser.
5. Write a program to implement the Computation of FIRST and FOLLOW of variables of grammar.
6. Write a program to compute the leading and trailing symbols of grammar.
7. Write a program to implement Operator Precedence Parser.
8. Write a program to implement SLR parser.
9. Write a program to check the data types.
10. Write a program to implement the generation of three address code.
11. Write a program to implement the computation of postfix notation.
12. Write a program to implement the computation of Quadruple.

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BTCS603 N	DCC	Introduction to Cloud Computing	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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COURSE OBJECTIVES

The student will have ability to:

1. Analyze the SAAS, PAAS IAAS services of Cloud Computing to represent how engineering agility in an organization can be created.
2. Assess the exploitation of web services from cloud computing.
3. Configure essential infrastructural components used for implementing Cloud.
4. Significantly study case studies to derive the most excellent practice model to be appropriate when deploying cloud-based applications.

COURSE OUTCOMES

Upon completion of the course, students will be able to:

1. Investigate the trade-offs among deploying applications in the cloud and over the local infrastructure.
2. Compute real-world problems security, privacy issues using cloud computing through group collaboration.
3. Development and Deployment applications over commercial cloud computing infrastructures.
4. Analyze and investigation of application & hardware performance, scalability, and availability of the underlying cloud technologies and software.

SYLLABUS

UNIT-I:

10 Hours

Overview of Cloud Computing

Introduction- Evolution, Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service-oriented computing and cloud environment, Advantages, Service & Deployment Models, Infrastructure, and Consumer View, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications.

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UNIT-II: 8 Hours

Cloud Computing Technology-

Client systems, Networks, server systems and security from services perspectives, security and privacy issues; accessing the cloud with platforms and applications; Cloud storage

UNIT-III: 9 Hours

Working with Cloud

Infrastructure as a Service – conceptual model and working, Platform as a Service – conceptual model and functionalities. Software as a Service –conceptual model and working.Trends in Service provisioning with clouds.Working on Microsoft Azure & IBM Smart Cloud.

UNIT-IV:

Using Cloud Services

9 Hours

Cloud collaborative applications and services – case studieswith calendars, schedulers, and event management; cloud applications in project management. Amazon Web Services & applications, AWS EC2, S3, Cloud Analytics, Cloud Open Stack

UNIT-V:

8 Hours

Case studies- Microsoft Azure, Google App Engine, IBM Smart Cloud and Open source clouds,- Open-Nebula, Sales force and Eucalyptus, Cloud Simulation

TEXT BOOKS:

1. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill.
2. Buyya, Selvi ,Mastering Cloud Computing, TMH Pub.
3. Michael Miller, Cloud computing – Web based Applications, Pearson Publishing, 2011

REFERENCES:

1. Kumar Saurabh, “Cloud Computing”, Wiley Pub,2012.
2. Krutz , Vines, “Cloud Security , Wiley Pub,2013.
3. Sosinsky, “Cloud Computing”, Wiley Pub,2012.
4. Murray Woodside; John Chinneck; Marin Litiou on “Adaptive Cloud Deployment Using

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Persistence Strategies and Application Awareness” IEEEExplore, Year: 2017, Page(s):277 – 290.

LIST OF PRACTICALS:

1. Service deployment & Usage over cloud using Virtual Box.
2. Performance evaluation of services over cloud using VMware tool.
3. Working of Google Drive to make spreadsheet.
4. Working on Heroku for Cloud application deployment.
5. Working on Aekasevices for Cloud application.
6. Working on services of Google App Engine.
7. Working on Application deployment & services of Microsoft Azure.
8. Working on Application deployment & services of IBM Smart Cloud.
9. Working and configuration of Eucelptus.
10. Deployment & Services of Amazon Web Services.

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BTCSM A601N	SEC	Virtual and Augmented Reality with iOS	60	20	20	30	20	2	0	2	3

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Course Objectives:

1. To describe the fundamental concept and components of virtual reality and augmented reality
2. To illustrate the advance concepts and interactive techniques in virtual reality
3. To illustrate the augmented and mixed reality concepts.
4. To describe advanced concepts of ARKit and SceneKit.

Course Outcomes:

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

1. Ability to develop virtual environments.
2. Ability to develop interaction techniques.
3. Ability to develop immersive augmented reality applications.
4. Ability to develop applications using ARKit and SceneKit.

Syllabus:

UNIT-I

8 Hours

Introduction to Virtual Reality

Introduction, Fundamental Concept and Components of Virtual Reality, Primary Features and Present Development on Virtual Reality, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR

UNIT-II

9 Hours

Interactive Techniques in Virtual Reality

Introduction, Form 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

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UNIT-III

10 Hours

Augmented and Mixed Reality

Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

UNIT-IV

9 Hours

ARKit and SceneKit Fundamentals:

Introduction, ARKit Game from a Single View Application, UIButton in an ARKit game and LBTA Components, How to Add a box in an ARKit Game with SCNBox, Remove Objects from ARKit Game Scene Tutorial, Reset ARSCN View in ARKit and Default Shapes, Plane detection in ARKit, Add a Floor with SCNPlane and to an ARKit game, Textures Materials in ARKit, Measure Distance in ARKit, Drawing App in ARKit.

UNIT-V

8 Hours

Augmented Reality apps with ARKit and SceneKit on iOS:

SceneKit Basics, design 3D objects, solar system without code using scene editor, flat surface detection system, image detection system, measuring apps etc.

Text Books:

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.
3. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.
4. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007.

Reference Books:

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1. Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.
2. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
3. Grigore C. Burdea, Philippe Coiffet, “Virtual Reality Technology”, Wiley Inter Science, 2nd Edition, 2006.
4. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application and Design”, Morgan Kaufmann, 2008.

List of Practicals:

1. Developing architecture of a house using Virtual Reality.
2. Perform CRO based experiment using Virtual Reality.
3. Undertaking qualitative analysis in Chemistry using Virtual Reality.
4. Carry out assembly/disassembly of an engine using Virtual Reality.
5. Develop plane detection system apps ARKit or SceneKit.
6. Develop measuring real world distance apps using ARKit or SceneKit.
7. Develop image recognition and tracking apps using ARKit or SceneKit.
8. Develop real world’s apps using ARKit or SceneKit.
9. Develop flat surface detection system using ARKit or SceneKit.

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BTDSE61 1N	DSE	Block Chain	60	20	20	30	20	3	0	2	4

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COURSE OBJECTIVES

The student will have ability to:

1. Provide conceptual understanding of how block chain technology can be used to innovate and improve business processes.
2. Covers the technological underpinning of block Chain operations in both theoretical and practical implementation of solutions using block Chain technology.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Understand block chain technology.
2. Develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
3. Build and deploy block chain application for on premise and cloud based architecture.
4. Integrate ideas from various domains and implement them using block chain technology in different perspectives.

SYLLABUS:

UNIT-I

10 Hours

Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain.

Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

UNIT-II

10 Hours

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Understanding Block chain with Crypto currency: Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT-III

9 Hours

Understanding Block chain for Enterprises: Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT-IV

8 Hours

Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain.

UNIT-V

8 Hours

Block chain application development: Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda.

TEXT BOOKS:

1. Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, 2015
2. Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming”.
3. Daniel Drescher, “Block Chain Basics”, Apress; 1st edition, 2017.
4. Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.

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- Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing.
- Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build Smart Contracts for Ethereum and Block Chain”, Packt Publishing.
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, Venkatraman. Ramakrishna, “Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer”, Import, 2018

LIST OF PRACTICALS:

- Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on Cloud to run.
<https://github.com/hyperledger/>
<https://docs.docker.com/get-started/https://console.ng.bluemix.net/docs/services/block-chain/index.html>
https://console.ng.bluemix.net/docs/containers/container_index.html#container_index
- Create and deploy a block chain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chaincode, and perform invoke and query on your block chain network
<https://developer.ibm.com/patterns/create-and-deploy-block-chain-network-using-fabric-sdk-java/>
- Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules.
<https://developer.ibm.com/patterns/interacting-with-a-block-chain-network/>
- Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network.
<https://developer.ibm.com/patterns/deploy-an-asset-transfer-app-using-block-chain/>
- Use block chain to track fitness club rewards Build a web app that uses Hyperledger Fabric to track and trace member rewards.
<https://developer.ibm.com/patterns/fitness-club-rewards-points-iot-and-retail-integration/>
- Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chaincode while storing results and data in the starter plan.
<https://developer.ibm.com/patterns/car-auction-network-hyperledger-fabric-node-sdk-starter-plan/>

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SEMESTER-VI (2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE61 1N	DSE	Block Chain	60	20	20	30	20	3	0	2	4

7. Develop an IoT asset tracking app using Block chain. Use an IoT asset tracking device to improve a supply chain by using Block chain, IoT devices, and Node-RED.
<https://developer.ibm.com/patterns/develop-an-iot-asset-tracking-app-using-block-chain/>
8. Secure art using block chain digital certificates. Node.js-based auction application can help democratize the art market
<https://developer.ibm.com/patterns/securing-art-using-block-chain-digital-certificates/>
9. Mini projects such as :
 - (i) Block chain for telecom roaming, fraud, and overage management. See how communication service providers use block chain to enhance their value chains.
<https://developer.ibm.com/patterns/block-chain-for-telecom-roaming-fraud-and-overagemanagement/>
 - (ii) Use IoT dashboards to analyze data sent from a Block chain network. Build an IoT app and IoT dashboards with Watson IoT Platform and Node-RED to analyze IoT data sent from a Block chain network.
<https://developer.ibm.com/patterns/iot-dashboards-analyze-data-block-chain-network/>
 - (iii) Create an Android app with Block chain integration. Build a Block chain enabled health and fitness app with Android and Kubernetes.
<https://developer.ibm.com/patterns/create-an-android-app-with-block-chain-integration/>
 - (iv) Create a global finance block chain application with IBM Block chain Platform Extension for VS Code. Develop a Node.js smart contract and web app for a Global Finance with block chain use case
<https://developer.ibm.com/patterns/global-financing-use-case-for-block-chain/>
 - (v) Develop a voting application using Hyperledger and Ethereum. Build a decentralized app that combines Ethereum's Web3 and Solidity smart contracts with Hyperledger's hosting Fabric and Chaincode EVM
<https://developer.ibm.com/patterns/voting-app-hyperledger-ethereum/>
 - (vi) Create a block chain app for loyalty points with Hyperledger Fabric Ethereum Virtual Machine. Deploy Fabric locally with EVM and create a proxy for interacting with a smart contract through a Node.js web app
<https://developer.ibm.com/patterns/loyalty-points-fabric-ethereum/>

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BTDSE612 N	DSE	Robotics	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

The objective of this course is to impart knowledge about industrial robots for their control and design.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Perform kinematic and dynamic analyses with simulation.
2. Design control laws for a robot.
3. Integrate mechanical and electrical hardware for a real prototype of robotic device.
4. Select a robotic system for given application.

SYLLABUS

UNIT-I

8 Hours

Introduction to Robotics: Types and components of a robot, Classification of robots, closed-loop and open-loop control systems.

Kinematics systems; Definition of mechanisms and manipulators, Social issues and safety.

UNIT-II

8 Hours

Robot Kinematics and Dynamics: Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobian, Singularity, and Statics Dynamic Modelling: Equations of motion: Euler-Lagrange formulation.

UNIT-III

9 Hours

Sensors and Vision System: Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc. Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/Similarity /Affine/Projective transformations. Vision applications in robotics.

UNIT-IV

8 Hours

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BTDSE612 N	DSE	Robotics	60	20	20	30	20	3	0	2	4

Robot Control: Basics of control: Transfer functions, Control laws: P, PD, PID. Non-linear and advanced controls.

UNIT-V

9 Hours

Robot Actuation Systems: Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.

Control Hardware and Interfacing: Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

TEXT BOOKS:

1. Saha, S.K., "Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
2. Ghosal, A., "Robotics", Oxford, New Delhi, 2006.
3. Niku Saeed B., "Introduction to Robotics: Analysis, Systems, Applications", PHI, New Delhi.
4. Mittal R.K. and Nagrath I.J., "Robotics and Control", Tata McGraw Hill.
5. Mukherjee S., "Robotics and Automation", Khanna Publishing House, Delhi.
6. Craig, J.J., "Introduction to Robotics: Mechanics and Control", Pearson, New Delhi, 2009
7. Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, "Robot Modelling and Control", John Wiley and Sons Inc, 2005
8. Steve Heath, "Embedded System Design", 2nd Edition, Newnes, Burlington, 2003.
9. Merzouki R., Samantaray A.K., Phathak P.M. and Bouamama B. Ould, "Intelligent Mechatronic System: Modeling, Control and Diagnosis", Springer.

LIST OF PRACTICALS:

1. Study components of a real robot and its DH parameters.
2. Forward kinematics and validate using a software (Robo Analyser or any other free software tool).
3. Inverse kinematics of the real robot and validation using any software.
4. Use of open source computer vision programming tool openCV.
5. Image Processing using openCV.
6. Image Processing for color/shape detection.
7. Positioning and orientation of robot arm.
8. Control experiment using available hardware or software.

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BTDSE612 N	DSE	Robotics	60	20	20	30	20	3	0	2	4

- Integration of assorted sensors (IR, Potentiometer, strain gages etc.), micro controllers and ROS (Robot Operating System) in a robotic system.
- Project work

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BTDSE613 N	DSE	Data Mining and Visualization	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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BTCS607N	PW	Minor Project	0	0	0	60	40	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

This course is the masters by coursework Minor Project.

A Minor Project is a substantial work of supervised research or development, requiring the equivalent of about four to six months full-time work from start to finish. A Project involves identifying a task or problem, searching and reviewing relevant literature, a proposed, implemented, and critically analyzed solution to the task or problem, and a written report describing the problem, the relevant literature, the solution, and its relation to other work in the area.

Note: This course includes a work integrated learning experience in which your knowledge and skill will be applied and assessed in a real or simulated workplace context and where feedback from industry and/ or community is integral to your experience.

Objectives/Learning Outcomes/Capability

Development Program Learning Outcomes

This course contributes to the following program learning outcomes:

- **Enabling Knowledge:**

You will gain skills as you apply knowledge with creativity and initiative to new situations. In doing so, you will:

- Demonstrate mastery of a body of knowledge that includes recent developments in Information Technology
- Recognize and use research principles and methods applicable to Information Technology.

- **Critical Analysis:**

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BTCS607N	PW	Minor Project	0	0	0	60	40	0	0	4	2	

You will learn to accurately and objectively examine, and critically investigate Information Technology (IT) concepts, evidence, theories or situations, in particular to:

- analyze and model complex requirements and constraints for the purpose of designing and implementing software artifacts and IT systems
- Evaluate and compare designs of software artifacts and IT systems on the basis of organizational and user requirements.

• **Problem Solving:**

Your capability to analyze complex problems and provide suitable solutions will be extended as you learn to: design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification.

• **Communication:**

You will learn to communicate effectively with a variety of audiences through a range of modes and media, in particular to: interpret abstract theoretical propositions, choose methodologies, justify conclusions and defend professional decisions to both IT and non-IT personnel via technical reports of professional standard and technical presentations.

• **Responsibility:**

You will be required to accept responsibility for your own learning and make informed decisions about judging and adopting appropriate behaviour in professional and social situations. This includes accepting the responsibility for independent life-long learning and a high level of accountability. Specifically, you will learn to: effectively apply relevant standards, ethical considerations, and an understanding of legal and privacy issues to designing software applications and IT systems.

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BTCS607N	PW	Minor Project	0	0	0	60	40	0	0	4	2

• **Research and Scholarship:**

You will have technical and communication skills to design, evaluate, implement, analyze and theorize about developments that contribute to professional practice or scholarship; specifically you will have cognitive skills:

- To demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice or scholarship
- To plan and execute a substantial research-based project, capstone experience and/or piece of scholarship.

Course Learning Outcomes

Upon successful completion of this course you should be able to:

- Identify a task or problem relevant to /or IT
- Search and review of the relevant literature
- Propose a solution to the task or problem
- Develop a software and/or algorithmic solution to the task or problem
- Implement solutions to meet high quality requirements developed by the supervisor
- Carry out research under supervision
- Present the research in a written form like that used for published papers
- Present the research in an oral seminar.

Overview of Learning Activities

A Minor project is a substantial work of supervised research or software development. You will choose an academic staff member as your supervisor to work on a research project. To successfully complete the course, you must demonstrate research skills: ability to undertake

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BTCS607N	PW	Minor Project	0	0	0	60	40	0	0	4	2	

research under supervision, ability to analyze, develop, and present the research in a written form like that used for published papers, and ability to present the research in an oral seminar.

In this course, you are expected to carry out research activities including implementing a complete solution to the problems identified by the supervisor, critical analysis of results, and completing a written Project. The major deadline for this course is the delivery of the Minor Project by the end of the semester.

Overview of Assessment

You must satisfactorily complete each of the following assessment tasks for this course:

- Research project comprising an implemented and critically analyzed solution to the task or problem
- Written report (final Project) describing the problem, the relevant literature, the solution, and its relation to other work in the area
- Seminar on your research (of 20 minutes) soon after your Project is submitted.

The Minor Project is assessed on its merits as a research publication. Each Project is examined by two academics, usually from within the Institute.

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BTCMA602N	SEC	Mobile Application Development-VI	-	-	-	-	100	-	-	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To illustrate the use of animation in iOS applications.
2. To design complex iOS application.
3. To introduce SwiftUI.

Course Outcomes:

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

1. Implement animations in iOS applications.
2. Implement complex applications that use notifications and advance layouts.
3. Create applications using third party APIs.
4. Understand new features of SwiftUI.

Syllabus:

UNIT-I

10 Hours

Animations and Collection Views

Animations: How do the pieces fit together?, Conveying an app’s personality, Why animate? , What can be animated? , UIView animation methods, Animation closures, The transform property, Animation in practice.

Collection Views: UICollectionView, Collection View Examples, Anatomy of a Collection View, Collection view cells, UICollectionViewLayout, Compositional layout.

UNIT-II

8 Hours

Generics and Dynamic Data

Generics: Array, Dictionary, Type constraints, Functions and methods, Associated types.

Dynamic Data: Search Controllers, Handling Data Changes, Diffable Data Sources.

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BTC SMA6 02N	SEC	Mobile Application Development-VI	-	-	-	-	100	-	-	4	2

UNIT-III

10 Hours

Layout and Notifications

Compositional Layout: UICollectionViewCompositionalLayout, Core components, Compositional Layout Sizes, Compositional Layout Items, Compositional Layout Groups, Compositional Layout Sections, Compositional Layout Supplementary Views, Multiple Layouts.

Advanced Layout: Advanced Compositional Layout, Section providers, unique sections, Orthogonal scrolling.

Local Notifications: Overview, Local and remote notifications, Best practices, requesting permission, scheduling local notifications, Handling and responding to notifications, actionable notifications.

UNIT-IV

8 Hours

Cloud Based Backend And User Authentication:

Integrate Third party APIs, Store data in Cloud using Firebase, Query Firebase, Firebase for user Authentication .

UNIT-V

8 Hours

Introduction to SwiftUI:

Overview: App Structure and behavior, User Interface: Views and controls, View Layout and presentation, Drawing and Animation, Framework Integration; Data and Events: Events and Data flow, Gestures.

Text Books:

1. Develop in Swift Data Collections. (as available on Apple Book Store)
2. Develop in Swift Fundamentals.
3. Jon Hoffman ,Mastering Swift 5: Deep dive into the latest edition of the Swift programming language, 5th Edition
4. Matthew Mathias, John Gallagher, Swift Programming: The Big Nerd Ranch Guide 4th edition, 2018.

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BTCSMA6 02N	SEC	Mobile Application Development-VI	-	-	-	-	100	-	-	4	2

5. Matt Neuberg , iOS 12 Programming Fundamentals with Swift, O'Reilly; 5th edition.

Reference Books:

1. Paris Buttfield-Addison, Jonathon Manning , Tim Nugent Learning Swift: Building Apps for macOS, iOS, and Beyond, O'Reilly Media, Inc., 3rd ed, 2018.
2. Vandad Nahavandipoor. iOS 11 Swift Programming Cookbook, O'Reilly Media, 2020

List of Practical:

Complete All the Lab Exercises, playgrounds and projects given in student material of Develop in swift Data Collections.

1. Create different apps using view-based animations and UI dynamics.
2. Create different apps using different Advance layout.
3. Create an App to Handle Local and Remote Notifications.
4. Create different apps using third party APIs.
5. Create an App for User Authentication using FireBase.
6. Create an App that Uses Cloud based Storage.
7. Create different applications using new features of SwiftUI.
8. Create an App to recognize gestures.

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