FOUNDATIONS AND BEYOND

A WORKSHOP ON COMPUTER SCIENCE ESSENTIALS

IMPORTANT CATEGORIES

- Introduction to Computer Science
  - Understanding of Computation
  - Programming Concepts
- Application Computer Science
  - Web/App/Game Development or Frontend/Backend Development
  - Skill-Specific Subjects (MERN, Flutter, Laravel, etc.)
- Core Computer Science
  - Data Science, Cloud Computing, Advanced Network Administration, Linux Administration, Competitive Programming, Internet of Things
- Specialization in Computer Science
  - Cyber Security, Blockchain, Robotics, AR/VR
  - Quantum Computing, System-level Programming

INTRODUCTION TO COMPUTER SCIENCE

UNDERSTANDING COMPUTATION

Curricular

- Digital Electronics
- Micro-processors
- Micro-controllers
- Computer Architecture and Organization

Co-Curricular

- Fundamentals of Operating Systems
- Fundamentals of Computer Networks

PROGRAMMING CONCEPTS

Curricular

- Theory, Syntax, Structure, Variables, Data Types
- Control Structures (Conditional and Loops)
- Arrays (1D and 2D) and String Manipulation
- Functions – Define, Parameters, Scope
- Object Oriented Programming
- Data Structures and Algorithms

Co-Curricular

- Error Handling and Debugging
- Version Control
- Coding Standards and Practices
- Advanced DSA
- Advanced Algorithms
- Competitive Programming

APPLICATION COMPUTER SCIENCE

SOFTWARE DEVELOPMENT

Frontend Development

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Backend Development

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WEB DEVELOPMENT

Curricular

- HTML, CSS, JavaScript
- Bootstrap
- Laravel (PHP)
- Django (Python)
- MySQL (SQL Database)

Co-Curricular

- Tailwind CSS
- MERN Stack – MongoDB, Express, React, Node
- Django
- RESTful APIs
- Deployment

APP DEVELOPMENT

Curricular

- Java
- Object Oriented Programming

Co-Curricular

- Android (Java or Kotlin)
- iOS (XCode Swift)
- Flutter (Cross-platform)
- React Native (Cross-platform)
- State Management (BLoC/Riverpod)

GAME DEVELOPMENT

Curricular

- C++
- Object Oriented Programming

Co-Curricular

- Scratch (For Beginning)
- Unity (2D + 3D + AR/VR)
- Unreal Engine

CORE COMPUTER SCIENCE

DATA SCIENCE

- Artificial Intelligence (AI)
- Machine Learning (ML)
- Deep Learning (DL)
- Natural Language Processing (NPL)

CLOUD COMPUTING

- DevOps
- Cloud Providers:
  - Amazon Web Service (AWS)
  - Google Cloud Platform (GCP)
  - Microsoft Azure
- Deploying and Managing a Cloud Server
- Dockers ad Containerization
- Microservices

COMPETITIVE PROGRAMMING

- Advanced Data Structures and Algorithms
- Leetcode
- Codeforces
- Hackerrank
- Chodechef
- ACDLadders
- Strivers

INTERNET OF THINGS

- Communication Methods: WiFi, Bluetooth, ZigBee, etc.
- Micro Processors: Raspberry Pi, Orange Pi, etc.
- Micro Controllers: Arduino, ESP32, Node MCU, etc.
- Sensors and Actuators: Ultrasonic, PIR Motion, Infrared, Button, Switch, etc.
- Basic C++ and Python Programming
- Projects:
  - Home Automation
  - Plant Monitoring
  - Digitalizing Things at Home

SPECIALIZATION IN COMPUTER SCIENCE

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Cyber Security

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Blockchain and AR/VR

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COMPUTER SCIENCE ROADMAPS

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- Ultimate Roadmap for Computer Science: https://dantusaikamal.medium.com/ultimate-roadmap-for-computer-science-ba2089408af8
- Map of Computer Science (YouTube): https://youtu.be/SzJ46YA_RaA
- God-Tier Developer Roadmap (YouTube): https://youtu.be/pEfrdAtAmqk

PROFILE DEVELOPMENT

TOPICS TO COVER

- GitHub and GitHub Student Developer Pack
- LinkedIn
- Portfolio
- DSA and Competitive Programming
- Hackathons and Competitions
- Participation in Events, Workshops, Conferences
- Online Communities