Commonwealth Educational Media Centre for Asia (CEMCA), New Delhi

in collaboration with

Andhra Pradesh Information Technology Academy (APITA), Vijayawada

presents

BLOCKCHAIN INTRODUCTION FOR DEVELOPERS

Contents

1 Background & Introduction

Andhra Pradesh Information Technology Academy (**APITA**) collaborated with **Commonwealth Educational Media Centre for Asia (CEMCA)** for offering a free Introductory Blockchain course for technical and non-technical students. The Blockchain Massive Open Online Course (MOOC) was delivered on the LMS platform **mookIT**.

Successful candidates / students have been given completion certificate jointly issued by APITA and CEMCA.

1.1 About CEMCA

The Commonwealth Educational Media Centre for Asia (CEMCA) was established by Commonwealth of Learning (COL) in response to needs expressed by the Commonwealth countries of the Asian region for a more effective utilization of educational media resources for Distance Education.

The **Vision** of CEMCA is to be the foremost agency in Commonwealth Asia that promotes media enabled learning for development and the **Mission** is to assist governments and institutions to expand the scale, efficiency, and quality of learning by using multiple media in open, distance and technology-enhanced learning.

1.2 About APITA

Andhra Pradesh Information Technology Academy (APITA) is a Society established by ITE&C Department, Government of Andhra Pradesh with an objective of promoting Industry-Academia – Government interaction, to impart training through the industry to produce readily employable graduates, to bridge the urban-rural divide in training and placements, and to enable literacy amongst socially and economically challenged sections of the society. It is formed to bring synergy among institutions of Government, Industry & Academia with the objective of offering quality human resources and services to the industry.

2 Blockchain and it's Future

Blockchain Technology adoption is becoming one of the most important IT initiatives of the current decade, thereby creating a huge demand of Blockchain professionals. Blockchain Technology is disrupting quite a few industries including Banking & Financial Services, Supply Chain, Insurance, Healthcare, Energy and Government. Some of key factors that will require a huge technical workforce that can understand and build Blockchain Applications are:

1. Demand for blockchain talent is growing at over 40% per quarter. According to LinkedIn, Blockchain is the topmost in the 10 most employable skills in demand
2. Investment from modest $ 900 Million in 2017 to $ 4.3 billion in 2020 & growing. The world is estimated to invest upwards of $3.1 Trillion in Blockchain by 2030.
3. 91% of the global IT infrastructure will be on Blockchain by 2030
4. Approximately only 50,000 skilled resources who are industry-ready globally
5. Over 50 countries have already embarked on initiatives to integrate blockchains in theireconomies and to develop a strong holistic blockchain ecosystem
6. 19 countries are actively working on Central Bank Digital Currency with Sweden and Canada taking the lead
7. Business value add in CAGR terms is approximately 68%until 2025 and in absolute terms approximately $ 179 billion
8. World economic survey suggested that 10% of global GDP will be stored in Blockchainby 2027

Scope, Impact & Industry

Figure below shows involvement and penetration of blockchain in almost all known industries and services.

3 Objective's Achieved

3.1 What was the Course about?

This blockchain introduction course provided an overview of the concept, technology, and impacts of blockchain on the industry. The focus of this course was primarily on giving students necessary information on how these systems work; analyze the security and regulation issues relating to blockchain technologies; and understand the impact of blockchain technologies on different industry sectors. There is a lot of hype and ambiguity about blockchain. The course objective was to cut through some of this confusion and help students understand what blockchains are really about so that they can make informed analyses and decisions regarding its use.

3.2 Learning Objectives achieved:

The Objective of this course is:

- To assess blockchain applications in a structured manner.
- To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
- To get familiarity with future currencies and to create own crypto token.

3.3 Learning Outcome of the Course:

- Understand the underlying concepts of blockchain to the level of implementation, leading and training their respective peers and teams across their organization
- Explain the need of blockchain and the real-world problem(s) that blockchain is trying to solve
- Understand the workings of Blockchain networks
- Explain the underlying technology of transactions, blocks, proof-of-work, and consensusbuilding
- Explain how does blockchain exist in the public domain (decentralized, distributed) yet maintain transparency, privacy, anonymity, security, immutability, history
- Achieve knowledge of bitcoin and cryptocurrency work
- Relate the differences between bitcoin, cryptocurrency and Blockchain
- Understand the different types of Blockchain and Protocols

3.4 Course Development:

Blockchain technology is new, niche, complex and the knowledge about this technology is slowly but steadily gaining ground.

The Blockchain introduction course has been developed keeping in mind the needs of engineering, non-engineering and undergraduate students who might not be exposed to general technology depths as yet. The idea was to let the students understand:

- How the technology is evolving
- What existing components it uses and what is new
- How this technology will revolutionize the solution development to existing and future business problems / challenges
- And lastly, where students can go to read and understand the Blockchain technology in depth

The entire MOOC course was developed at multiple levels dividing it into 4 modules. Each module had lectures that were logically grouped together totaling up to 50 lectures in total. Each lecture comprises:

- A video-based training (VBT) lecture. Each VBT included appropriate graphics and illustrations for easy understanding
- Transcript for later reading and reference

Along with the VBT, the students were provided with a detailed book for reference.

Development and Implementation Team:

The course was developed by Blockchain experts, engineers and architects who are actively engaged with technology industry developing solutions to different business challenges and in different business domains. The team comprises:

- **Mr. Jeeven Saini** – CEO of SofocleLabs with more than 30 years of industry experience
- **Mr. Jyot Prakash Mishra** – Founder of QThrust Pvt. Ltd with more than 5 years of Web Development Experience.
- **Mr. Saurabh Mishra** – PO CEMCA provided the guidance and was part of the operations team.

Course Duration:

The course was developed in English and so was the book. The entire course was of approximately 12 hours of video, divided into 4 modules with each module have an assessment at the end. Students spent approximately 15 to 20 hours on the entire course.

There were 10 live sessions of two hours each.

The course was opened for 5 weeks starting from 03rd Jan 2022 till 06th Feb 2022.

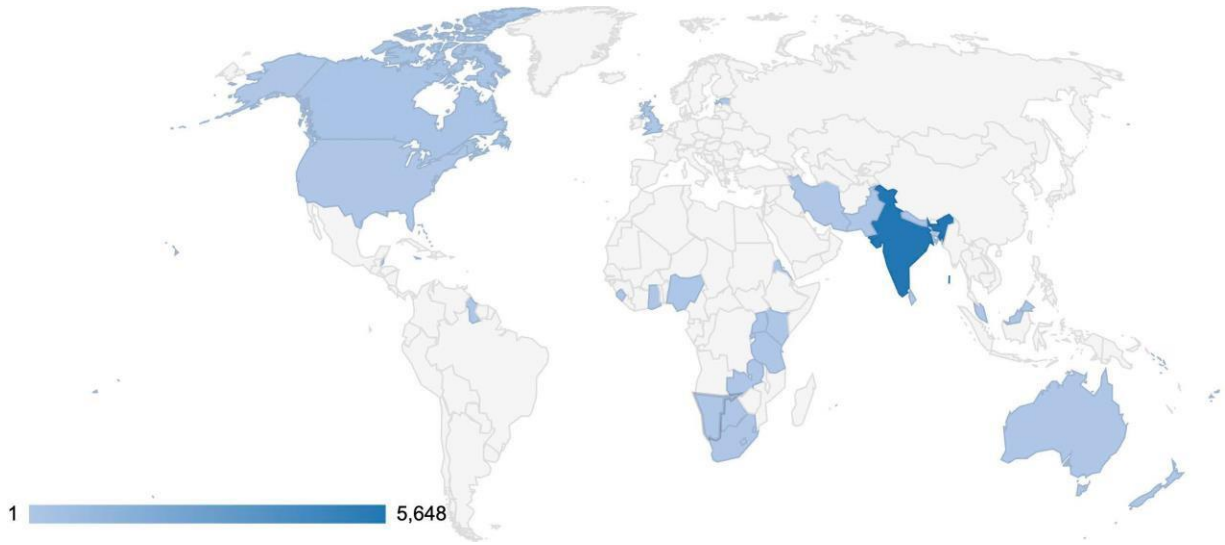
4 Students Section

4.1 Student Spread Across World

This course attracted students from 44 countries, with different sectors and industries like Academic, IT Experts, Government Officials and many more.

Total numbers of students registered for the course was **5999**

India contributed the maximum of **5648** students.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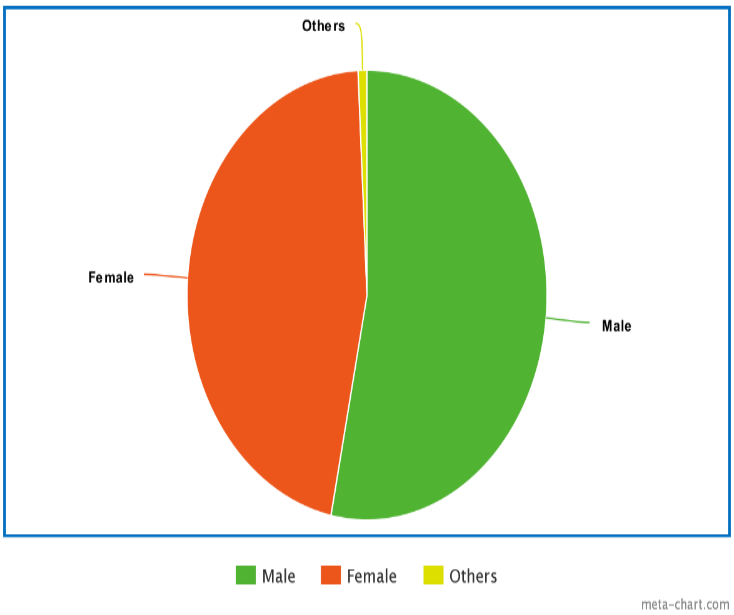
5,648

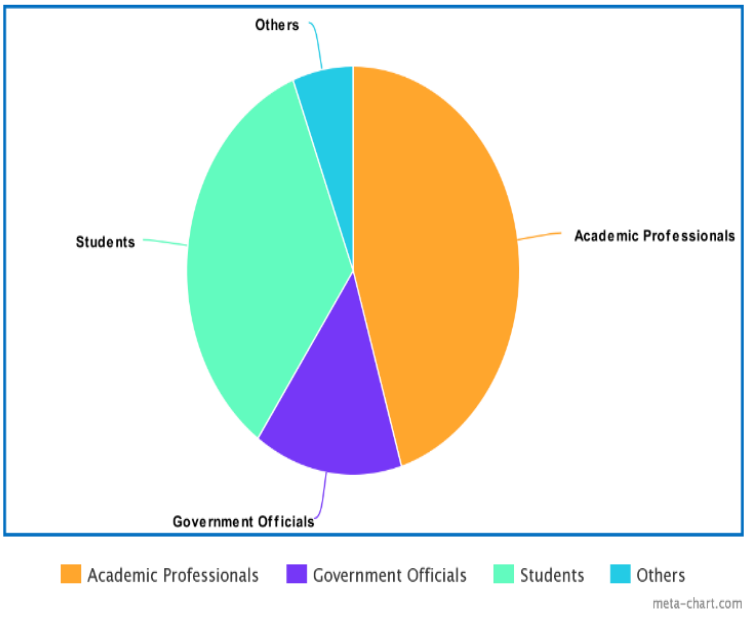
4.2 Country Reach

The students from 44 countries joined this course:

- Australia
- Bahamas
- Bangladesh
- Belize
- Botswana
- Canada
- East Timor
- Eritrea
- Estonia
- Fiji
- Gambia
- Ghana
- Guyana
- India
- Iran
- Jamaica
- Kenya
- Kiribati
- Lesotho
- Malaysia
- Maldives
- Mauritius
- Myanmar, {Burma}
- Namibia
- Nepal
- New Zealand
- Nigeria
- Pakistan
- Papua New Guinea
- Rwanda
- Saint Vincent & the Grenadines
- Samoa
- Sierra Leone
- Solomon Islands
- South Africa
- Sri Lanka
- Swaziland
- Tanzania
- Trinidad & Tobago
- UAE
- Uganda
- United Kingdom
- United States
- Zambia

4.3 Course/(Participatory) Statistics

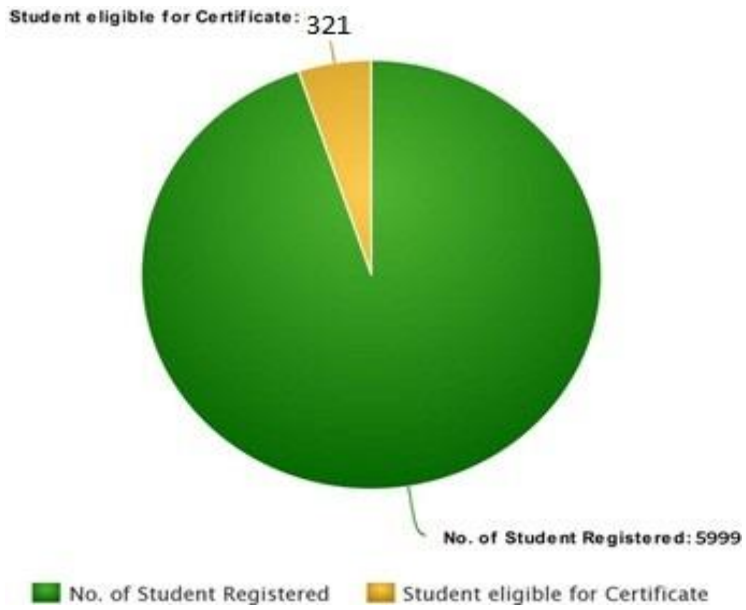




- **Total number of students registered for the course – 5999**
- **Total number of Female – 2759**
- **Total number of Male – 3193**
- **Others - 47**
- **Students – 2064**
- **Government Officials - 864**
- **Academic Professionals - 2064**
- **Other Professionals/Organization - 353**

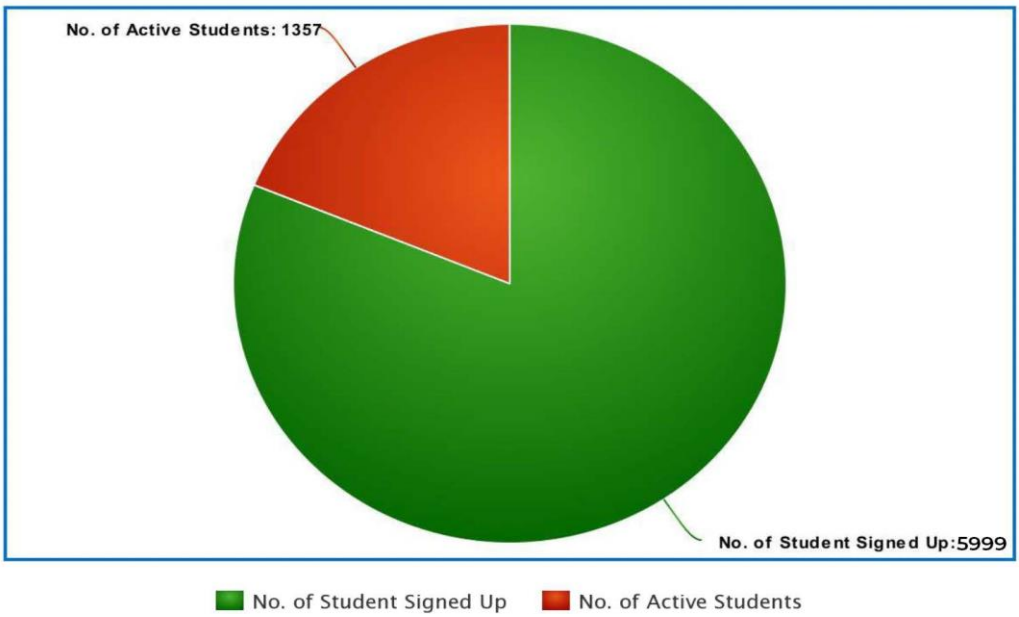
5 Course duration & Certification

- The duration of the course: from Jan 3rd to Feb 06th, 2022.
- The students were engaged for a minimum of 12 hours over the course duration who have successfully completed the course and passed all 4 quizzes.
- Completion certificate issued jointly by APITA and CEMCA to all students who have successfully completed the course.
- The total number of eligible students for certificates is 321.

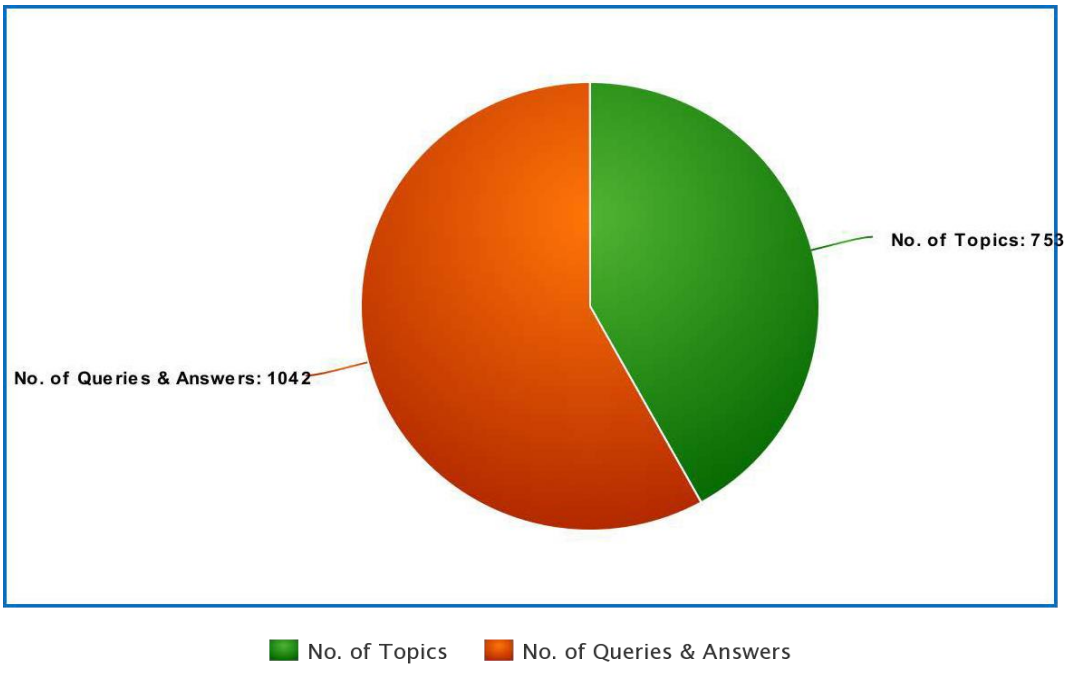


5.1 Student Activity During and After the Course

- Total number of active students (Average) - **1357**



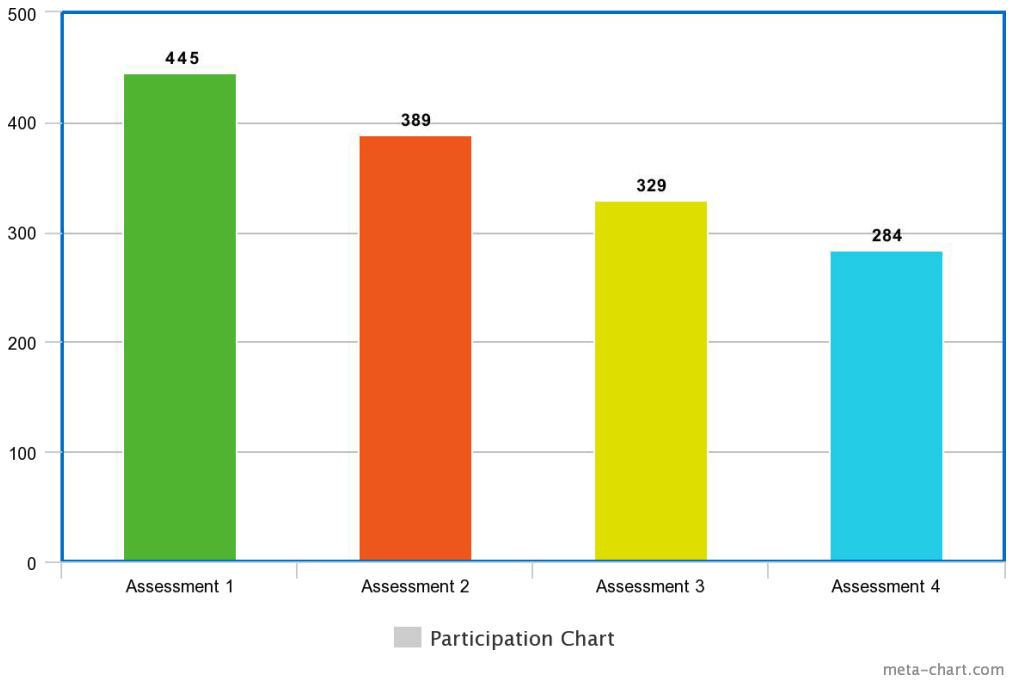
- Total number of Queries received & answered – **1042**
- Total number of discussions started on different topics – **753**



5.2 Assessment Related Stats

The course had 50 lectures divided into 4 modules. Each module had an assessment at the end. Following are the Statistics of all 4 assessments:

- Total number of Students Attempted the Assessment 1 – 445
- Total number of Students Attempted the Assessment 2 – 389
- Total number of Students Attempted the Assessment 3 – 329
- Total number of Students Attempted the Assessment 4 – 284



6 Content Covered

Module	Topic	Sub-Topic (Videos)
1	Databases to Web to Blockchain - (Historic journey to where we are today)	• Legacy Databases and where we are going • Evolution of WEB
		• Synchronization challenges with Distributed Systems and previous approaches
	Blockchain & it's Impact	• Definition of a Blockchain; Why Blockchain is better than a traditional systems
		• History of Bitcoin; Blockchain Industry Developments
	Cryptography & Blockchain Concepts	• Asymmetric & Symmetric cryptography
		• Digital Signatures, nonce, hashing and their Algorithms
		• Data Structures in Blockchain - Ledgers, Blocks, Transaction and Understanding Wallets
2	Distributed Ledgers and P2P Networks	• P2P Architectures and advantages of P2P Paradigm
		• Decentralized applications (dApps) and DLT's as a Backbone
	Use Cases & Applications	• Describing some use cases
		• Blockchain Challenges - Adoption & Technical, Where NOT to Use Blockchain
	Decentralization	• Reliance on Intermediaries in Legacy Systems
		• Definition of Decentralization - Levels & Extents
		• Off-chain & On-chain
3	Understanding Immutability and Consensus Mechanisms	• Understanding Immutability
		• Requirement of Establishing Consensus and Consensus Mechanisms (PoW (Double Spend Problem), PoS, PoET Mechanisms)
	Blockchain Classifications	• Types of Blockchain & their Features – Private, Public, and Permissioned Blockchain
	Smart Contracts and Logic Tier	• Smart Contracts as the next Logical Frontier
		• Definition of Smart Contracts
		• Applicability of Smart Contracts
4	Wallets, currencies, and token-economics	• Introduction to Ethereum. units in Ethereum, fees, meta-mask/mist, ERC-20, ERC-721
		• Different networks in Ethereum
	Other Blockchain Development Networks	• Multi-chain, Tendermint, Corda, Stellar and other Development Applications
	Multilayer Middleware and Design	• A thought on Blockchain with IOT, AI/ML
	d-Governance: Impact of Blockchain	• Utilities of Blockchain in the Future
		• d-Governance: Impact of Blockchain
		• Introduction to Scaling and Production

6.1 Module Content (summary)

Module 1:

This module covered **introduction** to the course, the discussion on contributing technologies & **basic building blocks** of blockchain, brief **history**, the basic **definitions,** impact on different business domains, the blockchain **fundamentals and data structures**. Following are some of the sample screens from this module:

Module 2:

This module covered the **peer-to-peer** property of the blockchain applications and how it helps in overall **decentralization goals** and design of **distributed ledger**. Number of **blockchain use-cases** were also discussed in this module along with certain important properties like **immutability, on-chain vs. off-chain and decentralization**. Following are some of the sample screens from this module:

Module 3:

This module covered some of the important fundamentals like **consensus mechanism, immutability, types of blockchains** & their properties. The other topic that was discussed in this module was **smart contracts,** their definition, development, and usage. Following are some of the sample screens from this module:

Module 4:

This last and concluding module covered the areas like **digital wallet, token economics,** different **blockchain protocols**, how blockchain will work with other immerging technologies like **IoT & AI/ML**. We also covered the future of **blockchain viz. utilities**, the impact on **governance** specially **decentralized governance** and the work that is being done around **scaling and performance** of blockchain networks. Following are some of the sample screens from this module:

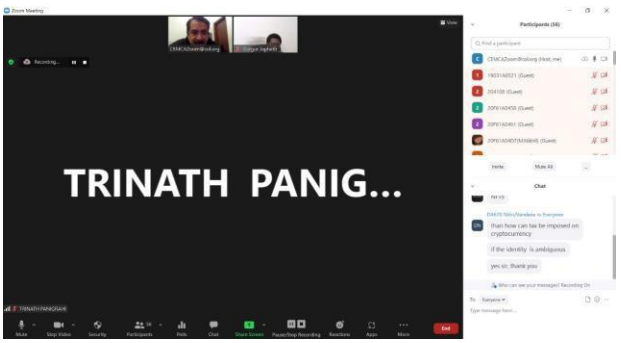
7 What was Delivered as Part of the Course? (Pedagogy of the course)

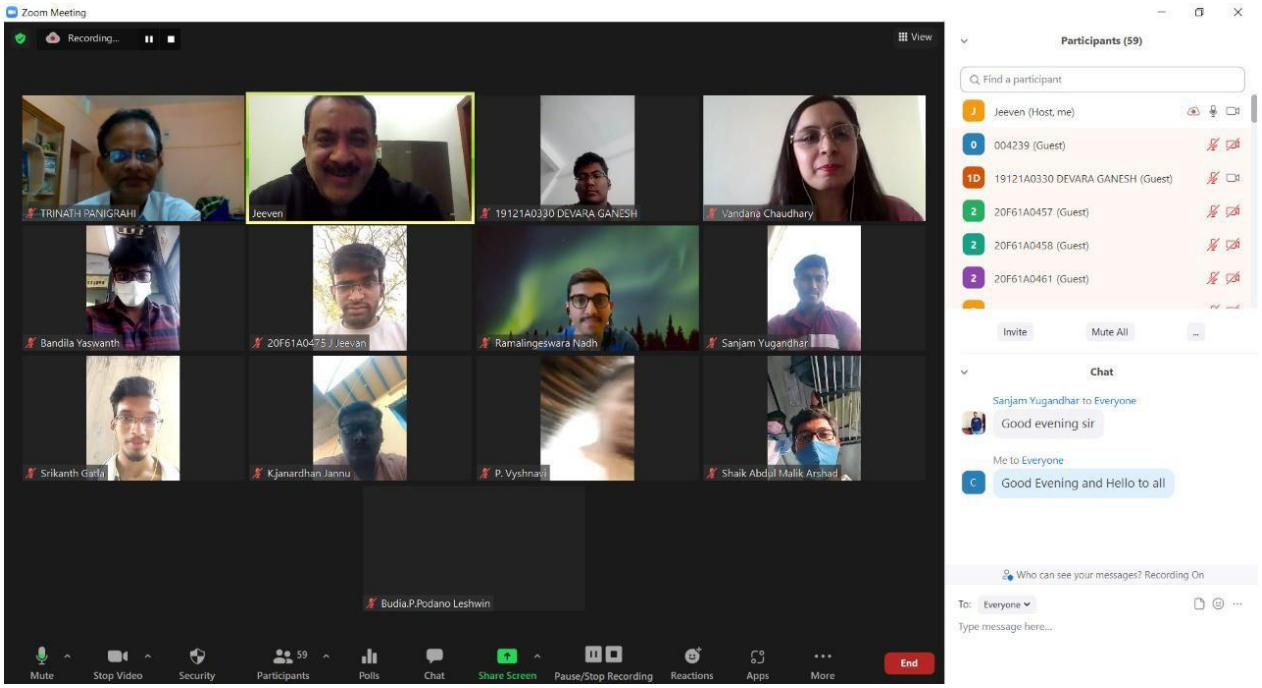
Following items were covered and delivered as part of this course:

- A 12-hour Blockchain Introduction course in MOOC format divided into 4 modules
- A handbook was provided to each student undertaking this course
- A copy of each lecture transcript (Knowing the online aspect of the course delivery the transcript of each lecture was provided to students for revision as well as a backup in case of systemic issue)
- Course completion certificate to all students who have successfully completed the course
- Live Sessions of two hours, twice every week.

8 Course Artefacts & Testimonies

8.1 Live Session Sample Screen





8.2 Testimonies

Submitted by trivedi_461 on Thu, 02/10/2022 - 18:03

Block chain technology is one of the emerging technology in software industry. This is one of the best course I have experienced with. Gained much more knowledge through this platform. Thankyou!

Shashank G • 3rd+
Student at Gandhi Institute of Technology & Management (GITAM) Univ...
3d •

Happy to announce that my knowledge on Blockchain increased to the moon after this course, it was a great content and thanks for the certification ser
Jeeven Saini

MR. SHIVENDRA BHATIA

Loved the way the entire course is planned and delivered. Also, the energy and the methodology Mr. Jeeven employs in conducting live sessions and his approach to student questions and replying such a complex topic in simple way. Just one word **- Awesome**

DR. PRAMOD KUMAR

Really good introduction to such a complex topic of Blockchain. Far deeper than mere introduction. Very good use case discussions during live sessions.

MR.TRINATH PANIGRAHI

The course was a good introduction to blockchain. All concepts were explained very well. The modular approach made it easier to understand, and the assignments for each gave a good practice on each topic. Overall, the course was very detailed and well structured.

MS. VANDANA

I learnt a lot about blockchain, the terms related to it, types of blockchain, stakeholders in the blockchain system, implementation challenges, etc.
Additionally, this course provides me with a rich number of references that will definitely be useful in the future. Overall easy-to-understand explanation from blockchain basics to implementation challenges are discussed. Pace of the course is good enough to complete the course successfully for anyone without any prior knowledge about blockchain. Really enjoyed the course

MR. J.P. MISHRA

Block chain is an emerging technology, learning about it is now a necessity. I have explored many courses but couldn't find such a detailed and thorough course. The instructor was havinga real experience which helped him to simplify the topics at our level. One of the best courses on internet.

9 Difficulties / Challenges / Lessons Learnt

- More time is needed for marketing / spreading awareness of such courses, specially covering emerging technologies
- Registration and enrolment process is to be single window process to make it easierfor students to enroll
- Videos to be made available in all possible formats
- Number of modules could have been increased for the entire course, allowing formore and easier assessments at the end of each module
- For emerging technologies that happen to be complex and therefore difficult tounderstand, the completion criteria should be easier

For Sofocle Labs
Jeeven Saini
CEO SofocleLabs