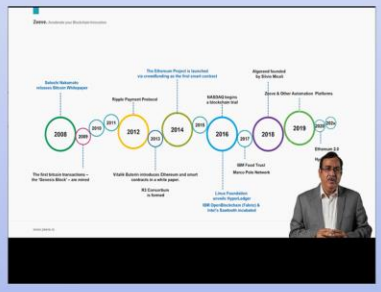
Blockchain, Innovation for Developers Course



VBT
On
Blockchain Introduction for Developers
May 18th – July 02nd, 2021

C·O·L
CEMCA

Commonwealth Educational Media Centre for Asia

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1 Background & Introduction

Sofocle Innovation Labs Pvt. Ltd. (SofocleLabs) and **Amity Institute of Information Centre** (**AIIT**) collaborated with **Commonwealth Educational Media Centre for Asia (CEMCA)** for creating a free Introductory Blockchain course for technical and non-technical students. The Blockchain Massive Open Online Course (MooC) was delivered on the LMS platform provided by SofocleLabs.

Successful candidates / students have been given completion certificate jointly issued by Amity, Sofocle Labs 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 Sofocle Labs

Sofocle Labs offer the way for universities and colleges to setup innovation hub for inculcating the culture of innovation in harnessing the power of emerging technologies like Blockchain. This is done by integrating content into University degree course curriculum or elective courses. Our course has been designed using analytical and hands-on approach to Blockchain, so as to enable the budding professionals to become proficient Blockchain engineers and architects of tomorrow. Many more such initiatives is the need of the hour to create a better Blockchain ecosystem and be at the forefront of industry 4.0.

The traditional Blockchain courses are highly pedagogic and lags behind the rapid changes happening in the core technology as well as its applications in the industry. Sofocle Labs is led by the Blockchain practitioners with experience of more than 4 years building cutting edge solutions and products using Blockchain.

1.3 About Amity Institute of Information Technology

Amity Institute of Information Technology (AIIT), Noida, which is an integral part of Amity University Uttar Pradesh, is a center of excellence for quality education in Information Technology with special focus on emerging trends.

AIIT has embarked on a mission to provide education at under-graduate, post-graduate, and doctoral level in the field of Computer Science and Applications. It also has its footprints in the futuristic and emerging areas of knowledge, learning and research in the field of Information Communication Technologies.

AIIT is working hard to develop the overall personality of students by developing them into excellent computing professionals, technocrats or technopreneurs.

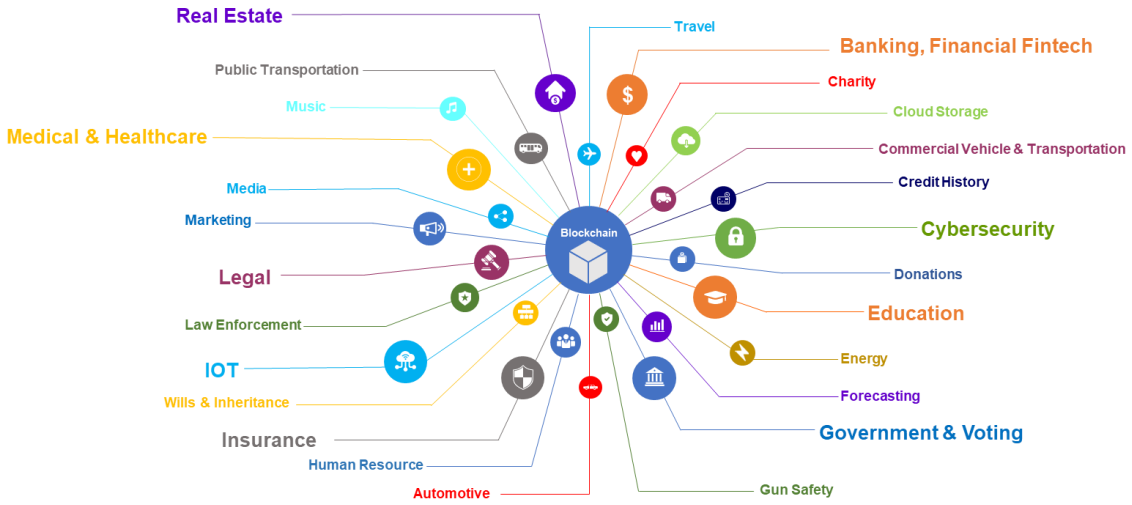
With a special focus on emerging technologies AIIT has partnered with Sofocle Labs – A Blockchain start-up to provide a holistic, industry focused and deep learning in Blockchain technology and its usage.

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 needed in the decade of 202X 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 their economies 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 Blockchain by 2027

Scope, Impact & Industry



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; analyse 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:

Students who have completed the course have achieved the following learning objectives:

- Core understanding of the underlying concepts of blockchain to the level of implementation leading and training their respective peers and teams across their organization
- Be able to explain why we need blockchain. What are the real-world problem(s) that blockchain is trying to solve
- Understand and describe how blockchain works
- Explain the underlying technology of transactions, blocks, proof-of-work, and consensus building
- They understand as to how does blockchain exist in the public domain (decentralized, distributed) yet maintain transparency, privacy, anonymity, security, immutability, history
- How does bitcoin and cryptocurrency work
- Understand difference between bitcoin, cryptocurrency and Blockchain
- Understand different types of Blockchain and Protocols

3.3 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. Ghan Vashishtha** – CTO of Zeeve inc. with more than 15 years of deep technology experience
- **Dr. Himdweep Khurana** – Computer Science Faculty at Amity University
- **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.

The course was opened for 4 weeks initially starting from 18th May 2021 until 18th June 2021. It was later extended until 02nd July 2021.

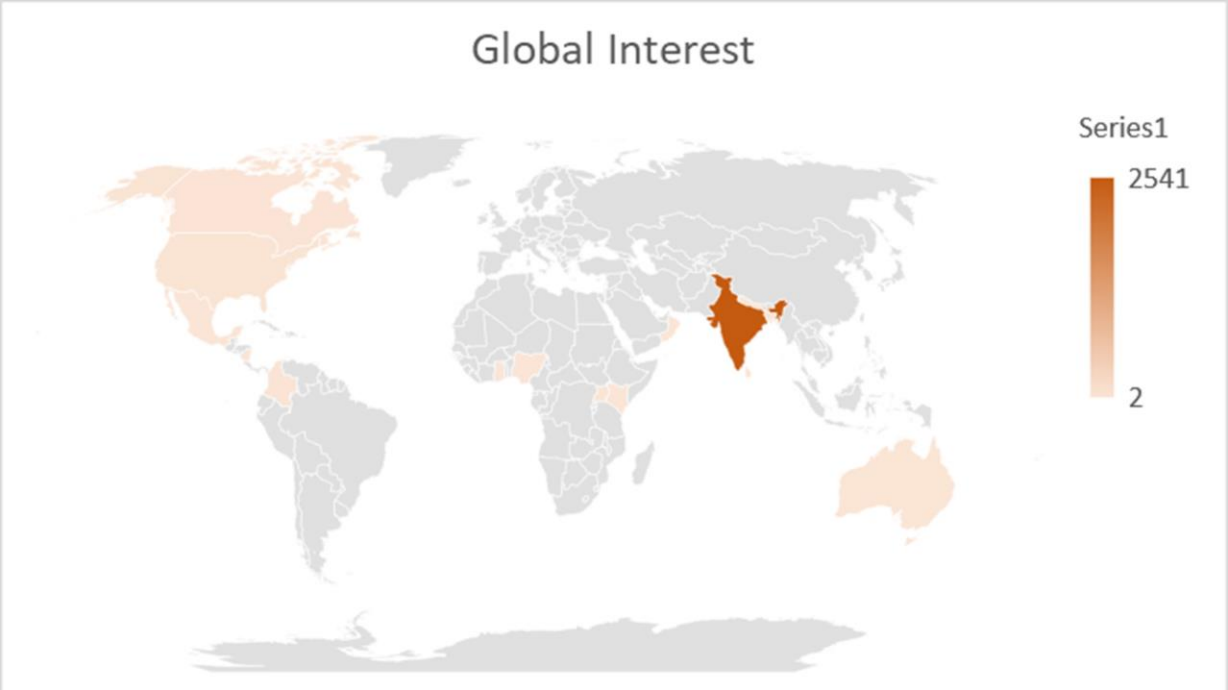
4 Students Section

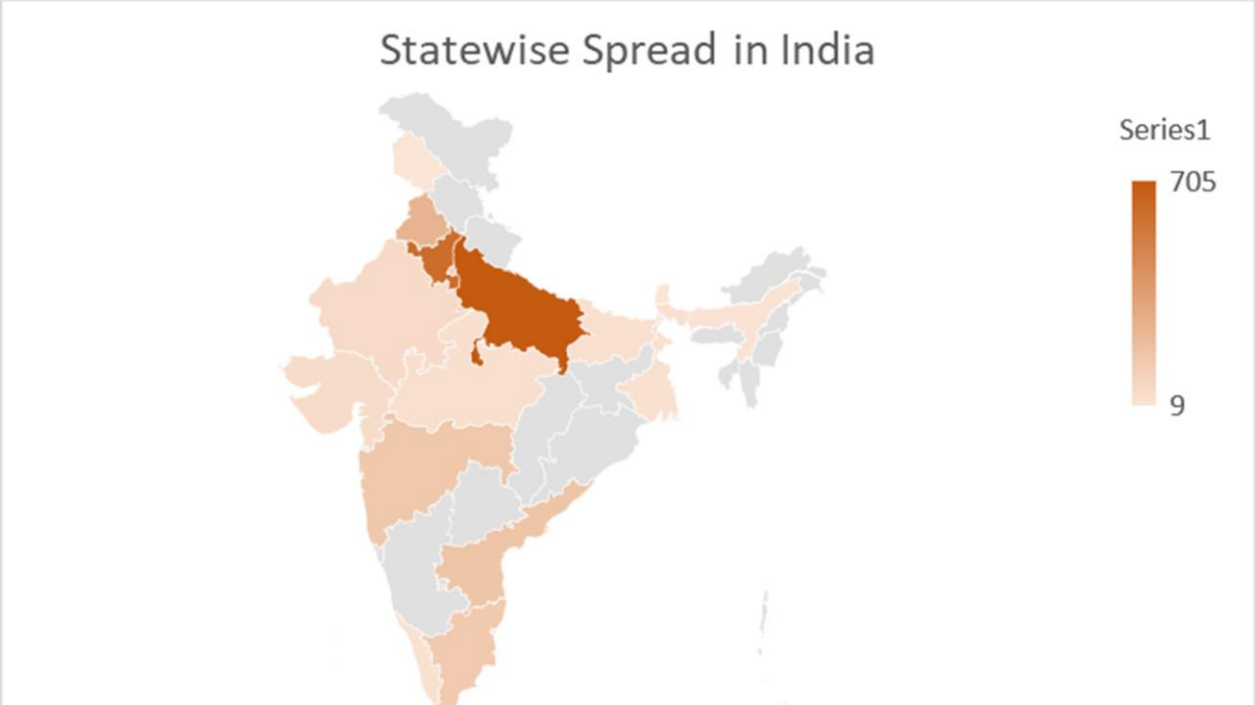
4.1 Student Spread Across World and Indian States

This course attracted students from 23 countries, namely India, Dubai, Bahrain, Columbia, Jamaica, Lagos, Mauritius, Port louis, Sri Lanka, US, Canada, Australia , Nicaragua, Oman, Bangladesh, Fiji, Ghana, Kenya, Mexico, Nepal, Nigeria, Uganda, and Bahamas.

Total numbers of students registered for the course was **2709**

India contributed the maximum of **2541** students.





4.2 Institutional / Organization Reach

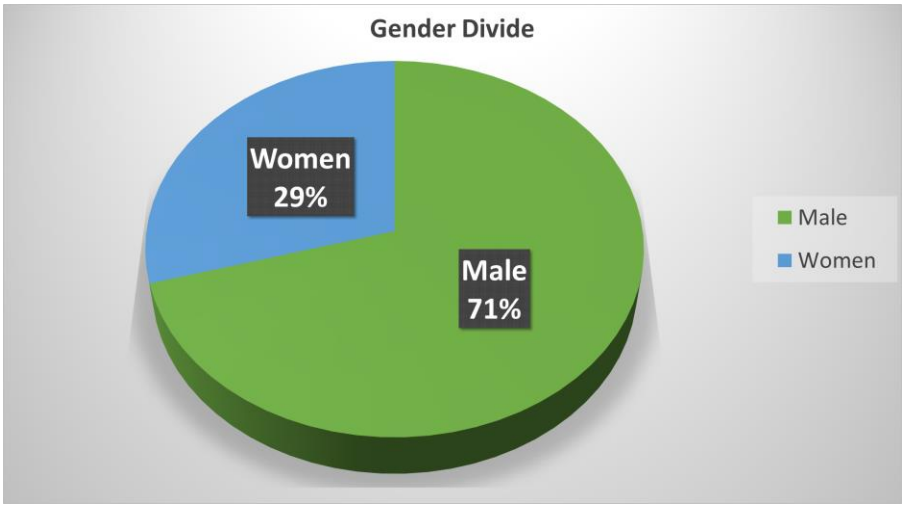
The universities / colleges / organizations from where the students joined this course is long. Some of the prominent institutions are:

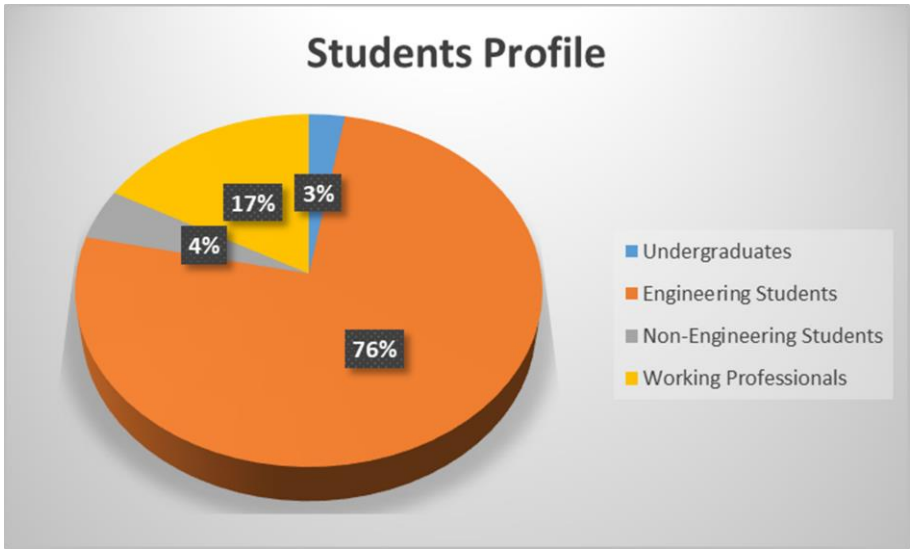
- Manav Rachna University – Faridabad, India
- Amity University – Global (Campuses across India, Dubai, Mauritius)
- Vellore Institute of Technology – TN, India
- Blockchain Development & Consulting – Columbia
- University of Trinidad and Tobago
- University of Technology Mauritius
- Delhi University
- Trident Group
- Thakur Institute of Management Studies, Career Development & Research (TIMSCDR) – Mumbai
- Tecnia institute of advanced studies – Delhi
- Sri Ram Group of Colleges – Muzaffarnagar
- National Insurance Academy
- MOP Vaishnav For Women
- Masco Exports Ltd.
- Lakshmibai College, Delhi university
- JEPPIAAR ENGINEERING COLLEGE
- Jaypee university of information technology
- Jaipuria institute of management Noida
- Islamic University in Uganda
- Instituto Tecnologico de Nuevo Laredo / Comunidad Bitcoin Laredos

- IIT Kharagpur
- IISER Kolkata
- Govt. Degree College Sopore
- Government Engineering College Banka
- GOVERNMENT COLLEGE CHHACHHRAULI
- Gateway college of Architecture and Design
- Emirates
- Bharath Institute of Higher Education and Research
- Acharya Narendra Dev College

4.3 Course/(Participatory) Statistics

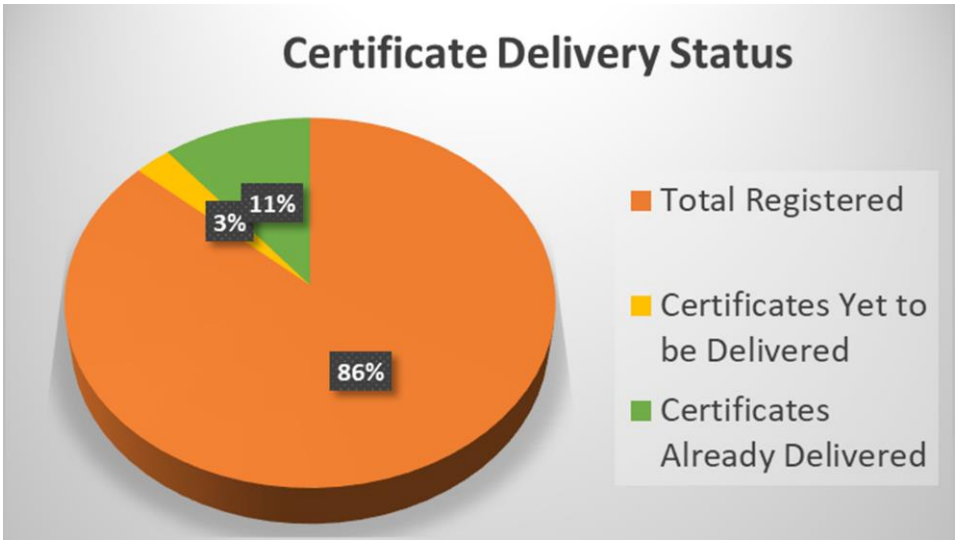
- **Total number of students registered for the course – 2709**
- **Total number of students eligible for certificates – 436**
- **Total number of Female – 797**
- **Total number of Male – 1912**
- **Undergraduates – 74**
- **Engineering Students – 2050**
- **Non-Engineering Students – 125**
- **Working Professionals - 460**





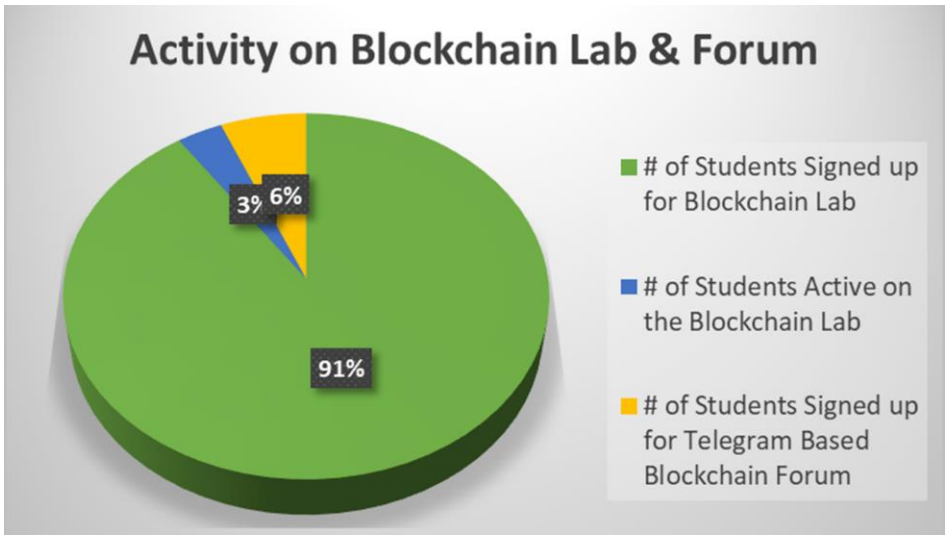
5 Course duration & Certification

- The initial duration of the course was planned for a month, from May 18th until June 18th, 2021. It was extended until July 2nd, 2021, on requests from students and some colleges.
- The students were engaged for a minimum of 15 hours over the course duration who have successfully completed the course.
- Completion certificate will be issued jointly by AIIT, CEMCA and Sofocle Labs to all students who have successfully completed the course
- The total number of eligible students for certificates is 420. Certificates already delivered is 337. Rest of the students have to create the wallet before a certificate can be issued to them

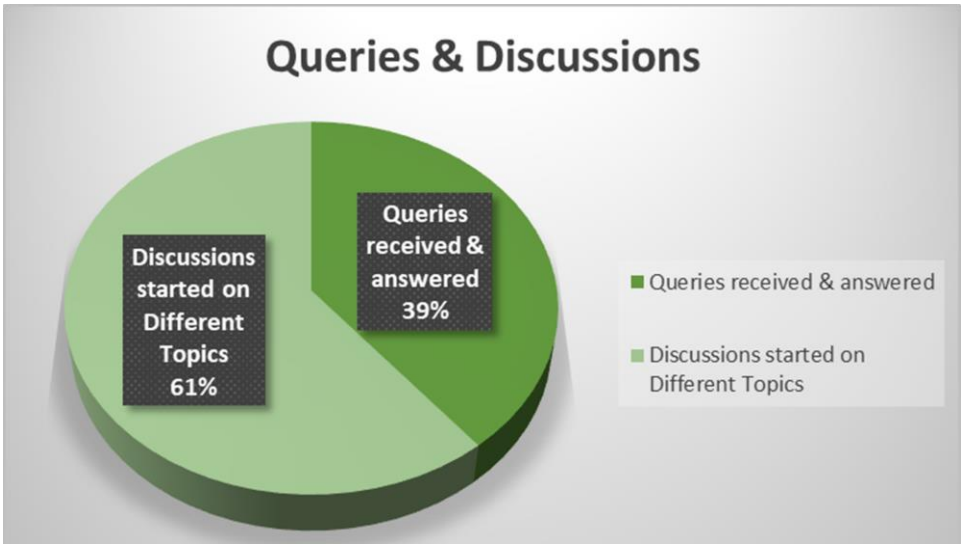


5.1 Student Activity During and After the Course

- Total number of students signed up for the Blockchain Lab – **1932**
- Total number of students active on the Blockchain Lab – **71**
- Total number of students signed up for the Telegram based Blockchain forum – **134**



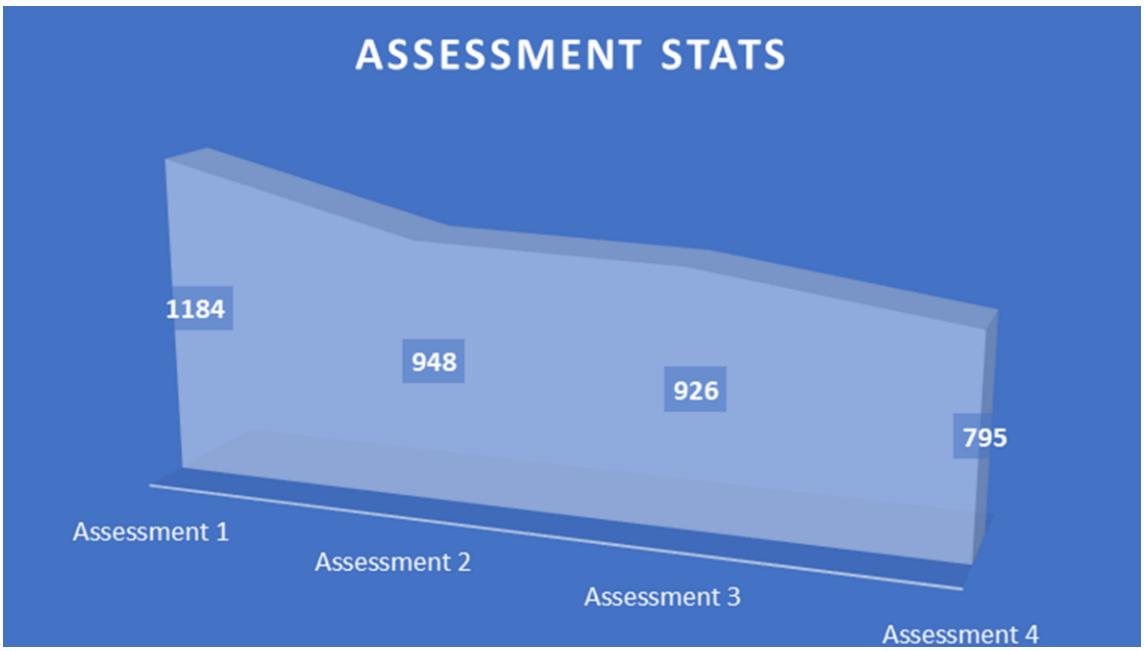
- Total number of Queries received & answered – **47**
- Total number of discussions started on different topics – **73**



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 – **1184**
- Total number of Students Attempted the Assessment 2 – **948**
- Total number of Students Attempted the Assessment 3 – **926**
- Total number of Students Attempted the Assessment 4 – **795**



6 Content Covered

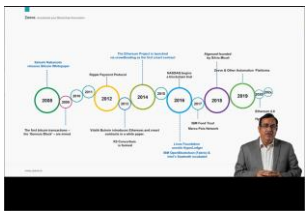
Module	Topic	Sub-Topic (Videos)
1	Databases to Web to Blockchain - (Historic journey to where we are today)	• Legacy Databases and where we are going • Evolution of WEB
		• Synchronization challenges with Distributed Systems and previous approaches
	Blockchain & it's Impact	• Definition of a Blockchain; 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

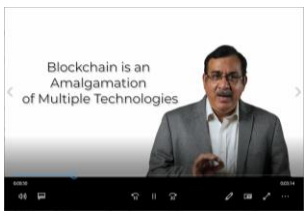
		• Applicability of Smart Contracts
4	Wallets, currencies, and token-economics	• Introduction to Ethereum. units in Ethereum, fees, meta-mask/mist, ERC-20, ERC-721
		• Different networks in Ethereum
	Other Blockchain Development Networks	• Multi-chain, Tendermint, Corda, Stellar and other Development 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

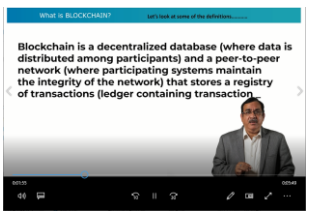
6.1 Content Sample Screens

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:

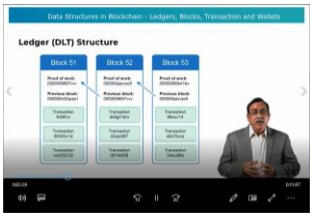


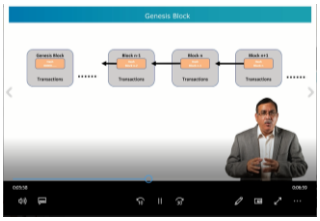




Module 2:

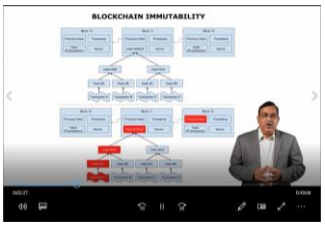
This module covered the **peer-to-peer** property of the blockchain applications and how it helps in overall **decentralization goals** and design of **distributed ledger**. Number of **blockchain use-cases** were also discussed in this module along with certain important properties like **immutability,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

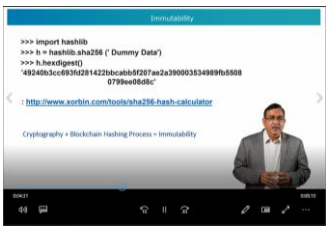




Module 3:

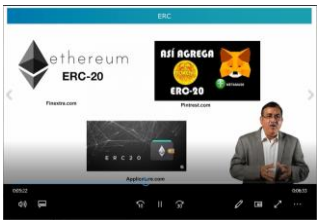
This module covered some of the important fundamentals like **consensus mechanism, immutability, types of blockchains** & their properties. The other topic that was discussed in this module was **smart contracts,** their definition, development, and usage. Following are some of the sample screens from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

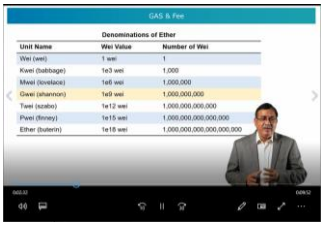


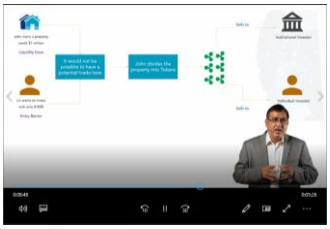


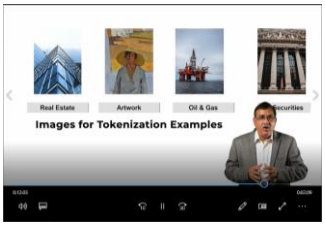
Module 4:

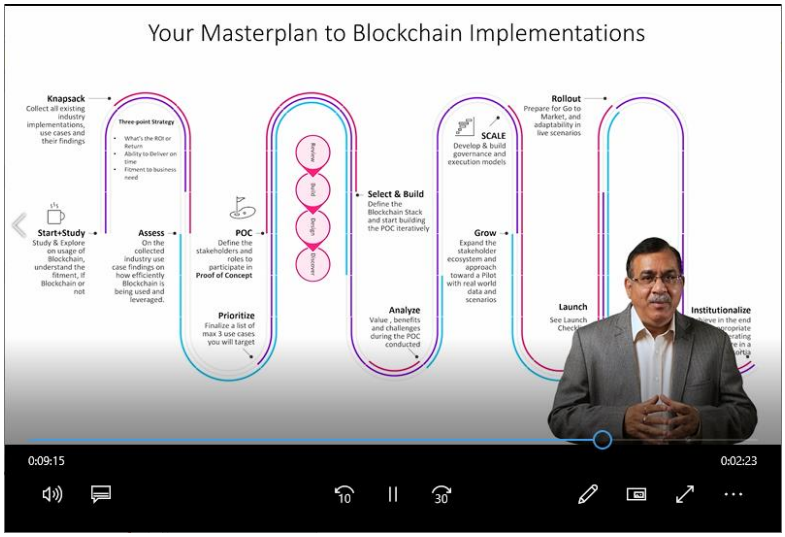
This last and concluding module covered the areas like **digital wallet, token economics,** different **blockchain protocols**, how blockchain will work with other immerging technologies like **IoT & AI/ML**. We also covered the future of **blockchain viz. utilities**, the impact on **governance** specially **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)

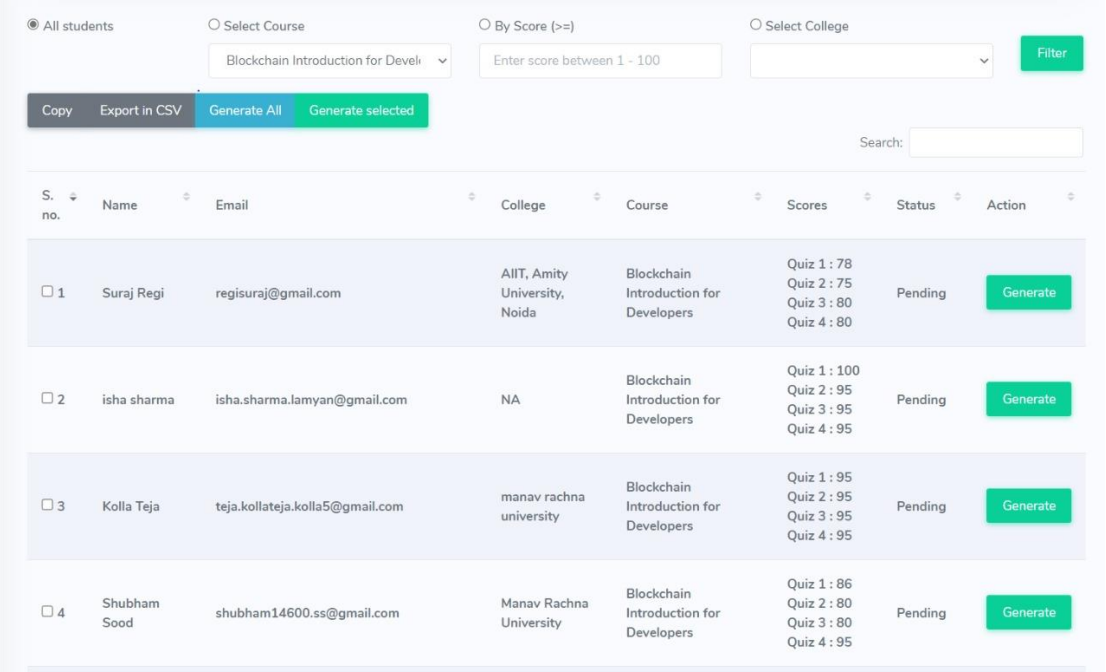
Following items were covered and delivered as part of this course:

- A ~12 hour Blockchain Introduction course in MOOC format divided into 4 modules
- The course was on the Sofocle Labs LMS platform
- 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
- Access to Blockchain Lab on Zeeve platform and membership to the Blockchain community on Telegram

8 Course Artefacts & Testimonies

8.1 Sample Certificate

8.2 Certificate Generation Screen from LMS



All students | Select Course: Blockchain Introduction for Devel | By Score (>=): Enter score between 1 - 100 | Select College | Filter

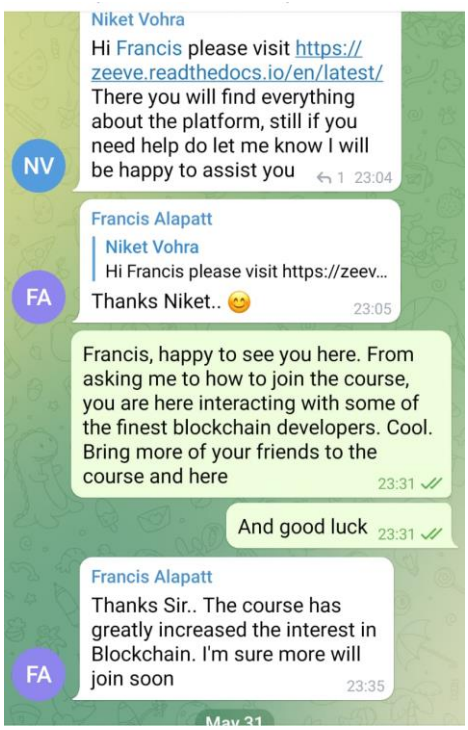
Copy | Export in CSV | Generate All | Generate selected

Search:

S. no.	Name	Email	College	Course	Scores	Status	Action
1	Suraj Regi	regisuraj@gmail.com	AIIT, Amity University, Noida	Blockchain Introduction for Developers	Quiz 1 : 78 Quiz 2 : 75 Quiz 3 : 80 Quiz 4 : 80	Pending	Generate
2	isha sharma	isha.sharma.lamyan@gmail.com	NA	Blockchain Introduction for Developers	Quiz 1 : 100 Quiz 2 : 95 Quiz 3 : 95 Quiz 4 : 95	Pending	Generate
3	Kolla Teja	teja.kollateja.kolla5@gmail.com	manav rachna university	Blockchain Introduction for Developers	Quiz 1 : 95 Quiz 2 : 95 Quiz 3 : 95 Quiz 4 : 95	Pending	Generate
4	Shubham Sood	shubham14600.ss@gmail.com	Manav Rachna University	Blockchain Introduction for Developers	Quiz 1 : 86 Quiz 2 : 80 Quiz 3 : 80 Quiz 4 : 95	Pending	Generate

8.3 Marketing Poster

8.4 Testimonies



Rushil Mathur, Electrical Engineering Student @ The University of Alberta, Canada

- The course was a great introduction to blockchain. All the concepts were explained and presented very well. The whole course was divided into modules which 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.
- Blockchain is clearly going to be a big part of the future. The course gives a great insight about all the necessary terminologies and concepts. This course offered various assignments which was indeed a great practice. ***I would definitely look forward to such courses in the future.***

Hanu Bhardwaj, Head – Department of Computer Science & Technology, Manav Rachna University

- In Department of Computer Science & Technology, we were already thinking and planning to introduce a full semester course in Blockchain Technology, and this VBT course offered by CEMCA and SofocleLabs was a very timely intervention that has helped us at University to emphasize the importance of Blockchain to all our students.
- The course was taken by hundreds of students and the common feedback is that the course is very well planned, far more in depth as compared to other introductory courses and has helped spark a keen interest in students to go deeper into the technology.
- The inclusion of handbook and membership of Blockchain lab are other best parts of the course.

- Overall, a great initiative by SofocleLabs and we look forward to many more such offerings in future for our students and faculty members.

Anas Mansoor, Computer Science Student @ Manav Rachna University

- A very eye-opening course in my opinion. I learnt so much 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. Bitcoin and other cryptocurrencies are also discussed. Really enjoyed the course.
- Considering the fact that this futuristic and potential bearing technology has all the tick-marks for being the technology of the future, there is sufficient reason to learn it. Some of the reasons which encourage enrollment in blockchain technology courses and also act as an advantage for getting certification in blockchain are:
    - Blockchain technology infrastructure is simple and does not need varied and different kinds of infrastructure. Rather, both of these technologies use the distributed ledger technology and have an infrastructure that is universal, more advanced than the others, and still compatible with many other processes in terms of its integration and robustness. Thus, this technology alters the way data is shared among various blocks.
    - The blockchain is slowly emerging and presently confined to financial transactions at the present. Right now, there are a lot of possibilities for it to branch out into various verticals and industries.
- It is a great course for Beginners who want to step in toward Blockchain and as we all know Blockchain is a future generation technology so it's better to start learning it from now because the way our modern world is changing it's really very difficult to cope with the world. It's a highly recommended course for all with any background.

Gaurav Agarwal (Investment Specialist), working@ ICICI PRUDENTIAL LIFE INSURANCE, EDUCATION: MBA (Finance)

- Overall, I really like this class because all lectures, assignments are straight forward. The way course covered different types of crypto and their evolution is to the point and easy to understand. Getting access on zeeve.io is an amazing experience, where we can work and get a better understanding on Blockchain and it's working. Going through the course I have gained insights on working and implications of blockchain. This has opened new opportunities for me to venture into. I am very much interested in such course in future which would add value and expand my knowledge.

Shivam Thakur, Computer Science Student @ Manav Rachna University

- The course was quite easy to understand as it explains the fundamental of blockchain technology. The material that were used to explain how blockchain works and others topic were simple and were filled with information which was quite easy to understand.

Now-a-days everyone want to invest in crypto but nobody knows how it works? Through this course I was able to understand that crypto work on blockchain and it is a decentralized currency which anyone can mine and no central authority is controlling it which makes it secure. I am verry much looking forward to courses like these in future.

Mahika Goyal, Computer Science Student @ Manav Rachna University

- The course was very informative and easy to understand. The topics were well explained and along with the videos, the pdf of every chapter helped to brush up the topics. All the basic fundamentals were covered in this course and a background was given explaining what you, as a developer, will be working with in this domain along with its goals and future progress.
- I would be grateful if I come across more opportunities as this. I'm thankful to SofocleLabs as well as my university due to which I got introduced to this new domain which I find very interesting and am planning to go further career-wise. The assessments after every module helped me understand how clear I was with my concepts and where I had to brush up.
- It was an enriching experience for me and I'm looking forward to more such opportunities in future.

Dr. Himdweep Khurana, Assistant Professor, Amity University

- The course content was designed keeping in mind the level of the students. The flow was simple and easy to comprehend. The students were able to grasp the concepts of blockchain easily and seem to be comfortable with the concept.

- The quality of video lectures was exceptionally good and that affected the overall delivery positively. As the course was on MOOC it gave an advantage and students were able to acquire knowledge about an upcoming technology without being concerned about commercials. I can affirmatively say that students would be looking toward to such courses in the future!

David Osario, Consultant, Blockchain Development & Consulting

Original feedback in Spanish:
"Sin lugar a dudas puedo decir que la calidad de los cursos de Sofocle Labs e indudablemente el profesionalismo y conocimiento de Jeeven Saini, Ghan y los demás instructores han rebasado mis expectativas. Sus temas actualizados y la explicación completa de los que está sucediendo el el mundo de las Tecnologías 4.0, la transformación digital de las empresas y los beneficios, adopción y casos de uso de Blockchain hacen de sus cursos la mejor herramienta para el aprendizaje y la preparación ya sea a nivel de negocios o técnico para cualquier empresario o profesional de tecnologías. Sus cursos y la calidad de sus videos así como los temas cubiertos me han ayudado mucho a conocer ésta nuevo y maravilloso mundo de Blockchain que es una de las tecnologías más disruptivas y novedosas desde el descubrimiento y uso del internet. Espero poder seguir aprendiendo y beneficiándome de éstos excelentes cursos para poder estar

a la vanguardia en conocimiento y como profesional para el mundo de los negocios a futuro en el mundo laboral y empresarial que sin lugar a dudas va a adoptar ésta tecnología y va a cambiar nuestras vidas como ya lo hizo el internet en los años 80's."

Translated in English:
Without a doubt I can say that the quality of the Sofocle Labs courses and undoubtedly the professionalism and knowledge of Jeeven Saini, Ghan and the other instructors have exceeded my expectations. Its updated topics and the complete explanation of what is happening in the world of Technologies 4.0, the digital transformation of companies and the benefits, adoption and use cases of Blockchain make its courses the best tool for learning and preparation. either at a business or technical level for any entrepreneur or technology professional. Your courses and the quality of your videos as well as the topics covered have helped me a lot to know this new and wonderful world of Blockchain, which is one of the most disruptive and innovative technologies since the discovery and use of the internet. I hope to continue learning and benefiting from these excellent courses to be at the forefront of knowledge and as a professional for the future business world in the work and business world that will undoubtedly adopt this technology and change our lives as the internet did in the 80's.

Neha Rai, Computer Science Student @ Manav Rachna University

- This course has been a wonderful learning journey and learned a lot about blockchain, cryptography and evolution of blockchain from history to its current industry scope. The depth of course was precise and detailed. Material of each module was deadly sufficient for understanding. Presentation and presenter was both clear cut for understanding. The duration of videos was just right. Thank you so much Jeeven Saini sir and collaborative teams for launching such a course and would also like to thank our HOD Ma'am and our mentors to bring this course for us.

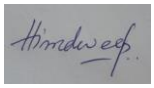
- As we all know the increasing industry benefits in blockchain because of its security and transparency across all business network. Wanted to learn about blockchain and cryptocurrency from a long time but never got suitable platform. And now I can say I understand this and can safely invest in crypto market. The handbook given along with the course is just the cherry on the cake and made the entire learning exercise a great pleasure.

K. Komal, Computer Science student @ Manav Rachna University

I am K. Komal, a 2nd year student of B tech. Computer Science at Manav Rachna University. The material of the course was very informative. The way the material was presented was good. The topics covered had relevance with the real-time situations and scenarios. For me personally, this course was very useful as I got to learn a lot about blockchain and its applications, its growth etc. It would be great if such courses (related to current trends) would be available to students. I am eagerly looking forward to such courses in future.

9 Difficulties / Challenges / Lessons Learnt

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



For Amity University

Dr. Himdweep Khurana

Prof. @ AIIT

For Sofocle Labs

Jeeven Saini

CEO Sofocle Labs