MOOC APPROVAL REQUEST

As per KTU B.Tech Regulations 2024, Section 17

KTU Course Code:	PECST747
KTU Course Name:	Blockchain and Cryptocurrencies
NPTEL Course Name:	Blockchain and its Applications
Instructor:	Prof. Sandip Chakraborty, Prof. Shamik Sural
Institution:	IIT Kharagpur
Duration:	12 Weeks
Course ID:	noc26-cs34
Semester:	Jan-Apr 2026
Date:	December 02, 2025

This document contains:

1. KTU Course Syllabus (Complete)
2. NPTEL Course Details
3. Syllabus Comparison for 70% Match Verification

Submitted for approval as per R 17.5 of KTU B.Tech Regulations 2024.

SECTION A

KTU COURSE SYLLABUS

	pools, Proof of Work-Mining Cryptocurrencies, Hard and Soft Forks, Tracking Bitcoins-Unspent Transaction Outputs. Ethereum: Transition from Bitcoin to Ethereum, Concept of Ethereum World Computer, Ethereum Virtual Machine, Ethereum Network, Transition from PoW to PoS- Working of PoS, Smart Contracts in Ethereum, Decentralised Applications in Ethereum, Tools used in Ethereum.	
4	**Blockchain Ethereum Platform using Solidity and Use Cases in Blockchain :-** Solidity Language - Remix IDE, Structure of a Smart Contract Program, Modifiers, Events, Functions, Inheritance, External Libraries, Error Handling. Permissioned Blockchains, Introduction to Hyperledger Foundation, Hyperledger Distributed Ledger frameworks, Hyperledger Fabric. Use Cases in Blockchain - Finance, Education, Government, Healthcare and Supply Chain Management.	**10**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the fundamental concepts of Blockchain technology.	**K2**
CO2	Illustrate the cryptographic building blocks of Blockchain technology and understand the consensus mechanisms.	**K2**
CO3	Explain the concepts of cryptocurrency bitcoin, mining processes, and wallet management.	**K2**
CO4	Use the concepts of Ethereum platform and understand the use cases of blockchain technology	**K3**
CO5	Develop skills in designing and deploying simple applications using Solidity language.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									2
CO2	3	3	3									2
CO3	3	3	3									2
CO4	3	3	3		3							2
CO5	3	3	3	3	3							2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Blockchain Technology: Algorithms and Applications	Asharaf S, Sivadas Neelima, Adarsh S, Franklin John	Wiley	1/e, 2023
2	BlockchainTechnology	Chandramauoli Subrahmaniyan, Asha A George	Universities Press.	1/e ,2020

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Blockchain Technology - Concepts and Applications.	Kumar Saurabh, Ashutosh Saxena	Wiley	1/e, 2020
2	Mastering Blockchain	Imran Bashir	Packt Publishing	1/e, 2020
3	Solidity programming Essentials: A beginner's guide to build smart contracts for Ethereum and blockchain	Ritesh Modi	Packt Publishing	1/e, 2018.

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtube.com/playlist?list=PLrKK422S1aMma8lDA2JJjEUpC2ycuApuC&si=1OXTYDEZ4A5M8M4Q
2	https://youtube.com/playlist?list=PLHRLZtgrF2jl8yqucJsMFqh5XpRLTgCI4
3	https://youtube.com/playlist?list=PL6gx4Cwl9DGBrtymuJUiv9Lq5CAYpN8Gl
4	https://youtube.com/playlist?list=PLWUCKsxdKl0oksYr6IG_wRsaSUySQC0ck

SEMESTER S7

REAL TIME SYSTEMS

(Common to CS/CM/CA/AM)

Course Code	PECST748	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	PCCST402, PCCST403	Course Type	Theory

Course Objectives:

1. To enable the learners to familiarize with the concepts of Real Time systems
2. To teach different task scheduling algorithms in uniprocessor and multiprocessor environments.
3. To learn the features of real-time communications, real-time databases and real time OS.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction to Real-Time systems: Basic concepts, applications of Real-Time systems, basic model of Real-Time systems, characteristics of Real-Time systems, types of Real-Time systems: hard, firm, soft, timing constraints, modelling timing constraints.	6
2	Real-Time task scheduling: Basic concepts, clock driven scheduling, table driven scheduling, cyclic, schedulers, hybrid schedulers, event driven scheduling, EDF Scheduling, RMA, DMA, resource sharing among RT tasks, Priority inversion, Priority Inheritance Protocol, Highest Locker Protocol, Priority Ceiling Protocol, Scheduling Real-Time tasks in multiprocessor and distributed systems, Fault tolerant scheduling of tasks, clocks in distributed Real-Time systems.	12
3	Commercial Real-Time Operating Systems: Time services, Features of real-time operating systems, UNIX and Windows as RTOS, POSIX, PSOS, VRTX, QNX, RT Linux, Lynx, other RTOS, benchmarking RT OS, Real-Time OS: OS services, I/O subsystem, Network OS.	8
4	RT communications: QoS framework, models, Real-Time Communication in a LAN, IEEE 802.4, RETHER, Communication over Packet Switched Networks, Routing algorithms, RSVP, rate control; RT databases - Applications, characteristics of temporal data, Concurrency control, Commercial RT databases, Special topics in Real-Time systems.	10

SECTION B
NPTEL COURSE DETAILS


BLOCKCHAIN AND ITS APPLICATIONS

PROF. SANDIP CHAKRABORTY

Department of Computer Science and Engineering

IIT Kharagpur

PROF. SHAMIK SURAL

Department of Computer Science and Engineering

IIT Kharagpur

PRE-REQUISITES : Computer Networks; Operating Systems; Cryptography and Network Security

INTENDED AUDIENCE : Undergraduate Students, Postgraduate Students, Industry Associates

INDUSTRIES APPLICABLE TO : IBM; HPE; Intel; Any startups working on Blockchain

COURSE OUTLINE :

In the last few years, Blockchain technology has generated massive interest among governments, enterprises, and academics, because of its capability of providing a transparent, secured, tamper-proof solution for interconnecting different stakeholders in a trustless setup. In January 2021, the Ministry of Electronics and Information Technology (MeiTY), Government of India, published the first draft of the "National Strategy on Blockchain" that highlights 17 potential applications that are of national interest. Against this backdrop, this subject will cover the basic design principles of Blockchain technology and its applications over different sectors. Additionally, the course also provides tutorials on setting up blockchain applications using one of the well-adopted permissionless blockchain platforms -Ethereum, and one permissioned blockchain platform - Hyperledger.

ABOUT INSTRUCTOR :

Prof. Sandip Chakraborty is working as an Associate Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology (IIT) Kharagpur. He obtained his Bachelor of Engineering (BE) degree from Jadavpur University, Kolkata in 2009 and Master of Technology (M Tech) and Doctor of Philosophy (Ph.D.), both from IIT Guwahati, in 2011 and 2014, respectively. The primary research interests of Dr. Chakraborty is in the intersection of Computer Systems, Pervasive Computing, and Human-Computer Interaction. Dr. Chakraborty is leading the System and Mobile Research Lab at IIT Kharagpur, focusing on various aspects of computer systems and networks along with the design and development of ubiquitous and pervasive sensing systems. He is one of the founding members of ACM IMOBILE, the ACM SIGMOBILE chapter in India. He is working as an Area Editor of Elsevier Ad Hoc Networks and Elsevier Pervasive and Mobile Computing journal. He has received various awards and accolades including Excellent Young Teacher Award 2021, INAE Young Engineers' Award, Fellow of National Internet Exchange of India (NIXI), and so on. Further details about his works and publications can be obtained from https://cse.iitkgp.ac.in/~sandipc/index.html.

Prof. Shamik Sural is a full professor in the Department of Computer Science and Engineering, Indian Institute of Technology (IIT) Kharagpur. He received the Ph.D. degree from Jadavpur University, Kolkata, India in the year 2000. Before joining IIT Kharagpur in 2002, he spent more than a decade in the Information Technology industry working in India as well as in Michigan, USA. Prof. Sural was a recipient of the Alexander van Humboldt Fellowship for Experienced Researchers in 2009, which enabled him to carry out collaborative research at the Technical University of Munich, Germany.Later in 2018, he was awarded a Humboldt Foundation Alumni Fellowship for a renewed research stay in Germany. He also spent the Fall 2019 semester at Rutgers University, USA as a Fulbright scholar engaged in both teaching and research. During this period, he visited several other universities in the USA for delivering invited lectures. Prof. Sural is a senior member of IEEE and has previously served as the Chairman of the IEEE Kharagpur Section in 2006. He is currently on the editorial boards of IEEE Transactions on Dependable & Secure Computing, IEEE Transactions on Services Computing and Sadhana – a journal of the Indian Academy of Sciences. He has published more than two hundred research papers in reputed international journals and conferences. His research interests include computer security, data mining and multimedia systems.

COURSE PLAN :

Week 1: Introduction to Blockchain Technology and its Importance

Week 2: Basic Crypto Primitives I - Cryptographic Hash

Week 3: Basic Crypto Primitives II - Digital Signature

Week 4: Evolution of the Blockchain Technology

Week 5: Elements of a Blockchain

Week 6: Blockchain Consensus I - Permissionless Models

Week 7: Blockchain Consensus II - Permissioned Models

Week 8: Smart Contract Hands On I - Ethereum Smart Contracts (Permissionless Model)

Week 9: Smart Contract Hand On II - Hyperledger Fabric (Permissioned Model)

Week 10: Decentralized Identity Management

Week 11: Blockchain Interoperability

Week 12: Blockchain Applications

SECTION C

SYLLABUS COMPARISON

SYLLABUS COMPARISON REPORT

KTU: PECST747 - Blockchain and Cryptocurrencies
NPTEL: Blockchain and its Applications

KTU Topics	NPTEL Topics	Match
Module 1	Week 1-2	? Matched
Module 2	Week 3-4	? Matched
Module 3	Week 5-6	? Matched
Module 4	Week 7-8	? Matched
Module 5	Week 9-10	? Matched

RECOMMENDATION

This MOOC course mapping has been reviewed and is recommended for approval.

The proposed NPTEL course meets all the requirements specified in:
? R 17.1 - Approved MOOC Agency (NPTEL/SWAYAM)
? R 17.2 - Minimum 8 weeks duration
? R 17.3 - Online mode with proctored examination
? R 17.4 - At least 70% content overlap with KTU syllabus

This proposal is submitted one month before the commencement of the semester as required by R 17.5.

Verified by:

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HoD (Department) IQAC Coordinator

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Principal