



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor/Master of Engineering Syllabus

Subject Code : 3174503

Subject Name : Fog Computing

WEF Academic Year :	Jan - 24
Semester :	7
Category of the Course :	Bachelor of Engineering

Prerequisite:	<ul style="list-style-type: none">• Basic Computer Science and Programming Skills• Fundamental understanding of cloud computing• Programming skills in at least one language (e.g., Python, Java)
Rationale:	The fog computing syllabus is designed to equip students with essential skills for handling the intermediate layer between cloud and edge computing, crucial for IoT applications. It covers key technologies, security, and performance optimization, offering hands-on experience and addressing industry demand. This prepares students for diverse career opportunities and future technological advancements.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	0	3	70	30	00	00	100

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Introduction to Fog Computing: Definition and evolution, Differences and connections between cloud computing and fog computing, Key characteristics and advantages	4	10
2	Fog Computing Architecture: Components of fog computing architecture, Data processing and storage at the edge, Communication and networking in fog environments	4	15
3	Technologies Enabling Fog Computing: IoT protocols and devices, Edge analytics and real-time data processing, Virtualization and containerization technologies	5	15



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4	Fog Computing Applications: Case studies in smart cities, healthcare, transportation, and industry 4.0, Integration with IoT and AI, Real-time analytics and decision-making	4	15
5	Programming for Fog Environments: Developing and deploying applications on fog nodes, managing distributed data and compute resources, Hands-on projects using popular fog computing platforms (e.g., Cisco IOx, EdgeX Foundry)	4	15
6	Security and Privacy in Fog Computing: Security challenges and solutions, Privacy concerns and data protection, Trust and identity management	4	15
7	Future Trends in Fog Computing: Emerging research areas, Integration with 5G and beyond, Sustainable and green fog computing	5	15
Total		30	100

Reference Book :

1. "Fog and Edge Computing: Principles and Paradigms" by Rajkumar Buyya and Satish Narayana Srirama
2. "Fog Computing in the Internet of Things: Intelligence at the Edge" by Amir M. Rahmani, Pasi Liljeberg, Predrag Tomić, Jürgen Panneerselvam, and Nikil Dutt
3. "Fog and Edge Computing: Advances and Applications" by Yang Yang, Nan Zhang, Kun Wang, and Ching-Hsien Hsu
4. "Edge-Fog Computing in the Internet of Things (IoT): Principles, Techniques, and Applications" by Fadi Al-Turjman
5. "Fog Computing: Concepts, Frameworks, and Technologies" by Debasis Das, Binod Kumar Pattanayak, and Srikanta Patnaik
6. "Fog Computing: Theory and Practice" by Mukesh Singhal and Muthukumar S. Murugesan
7. "Fog Computing: Introductions and Applications" by Rajiv Ranjan, Rajkumar Buyya, and Sandeep K. Sood
8. "Edge and Fog Computing: Models, Frameworks, and Architectures" by Javid Taheri, Sameh Sorour, and Liang Zhao
9. "Fog Computing in 5G Mobile Networks: A Comprehensive Survey" by Mukherjee, S.K., Aditya K. Gupta, and Dushyant S. Saini
10. "Fog Computing: A Smart Solution for Energy Management in Smart Buildings" by J. Ortiz, M. Cuéllar, R. Toledo-Moreo, and F. Moya



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Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Understand Fog Computing Concepts and Principles	RM/UN
02	Analyze Fog Computing Architectures and Technologies	AN
03	Design and Implement Fog Computing Solutions	AP
04	Evaluate Security and Privacy Challenges in Fog Computing	EV
05	Optimize Performance and Scalability of Fog Networks	AN/EV

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Additional Resources and Recommendations:

Online Courses: Students can take online courses from platforms like Coursera, edX, or Udacity on specific topics like cloud computing, networking, and cybersecurity.

Books: Recommended readings might include textbooks on computer networks (e.g., "Computer Networking: A Top-Down Approach" by Kurose and Ross), cloud computing (e.g., "Cloud Computing: Concepts, Technology & Architecture" by Erl et al.), and IoT (e.g., "Internet of Things: Principles and Paradigms" by Raj and Raman).

Hands-on Labs: Encourage students to set up their own virtual machines, work on small cloud projects, or use IoT kits (e.g., Raspberry Pi, Arduino) to gain practical experience.

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