TE 578/778: Software Defined Networking and Network Function Virtualization

Week	Session	Topics
Week 1: **SDN Concepts and Implementations**	Session 1: SDN Origin and Evolution	- Overview of SDN origin and evolution - Centralized and Distributed Control and Data Planes - Introduction to the OpenFlow Protocol
	Session 2: SDN Controllers and Network Programmability	- Deep Dive into SDN Controllers; Floodlight, RYU, POX, Opendaylight - Mininet & OpenFlow Labs * Setting up simple SDN topology using Mininet * Integrating SDN controllers * Introduction to network programmability using python.
	Session 3: SDN in Various Environments and Applications	- SDN in the Data Center - SDN in other environments - SDN applications and deployment strategies
Week 2: **NFV Concepts and Implementations**	Session 4: Network Function Virtualization (NFV)	- Introduction to NFV and Network Slicing - NFV Orchestration and Management using Open-Source MANO and Tacker - Network Slicing - Introduction to Containerization using Docker - Introduction to Kubernetes as an Orchestration tool.

		• Hands on lab using Containernet (emulated network topologies using docker) • Orchestration of docker instances using Kubernetes.
	Session 5: Virtual Network Functions (VNFs) and Infrastructure	• Designing and Implementing Advanced VNFs • Deploying and Managing VNFs in a Virtualized Environment • Software-defined Storage and Networking: Storage Communication Protocols • Storage in Cloud Data Centers • Data Center Software
	Session 6: NFV Infrastructure and Optimization	• NFV Infrastructure Components and Optimization • Traditional Network Tunneling Protocols • Performance Tuning for NFV Deployments
Week 3: **Integration, Security, and Future Trends**	Session 7: Integrating SDN and NFV	• Strategies and Techniques for Integrating SDN and NFV • Real-world Use Cases and Implementations • Building Integrated SDN-NFV Solutions
	Session 8: Security in SDN	• SDN Security Principles • Potential Attacks in SDN • Countermeasures and Mitigation Strategies • Research Trends in SDN Security • AI and SDN Security • Cross-Layer Security Approaches