Here's a 16-week lesson plan for a **Computer Networks Practicals** course for beginners, structured with two lectures per week. Each week covers specific hands-on practical skills, with a focus on basic networking concepts, tools, and protocols. The lectures aim to build foundational knowledge and gradually introduce more complex topics.

Week 1: Introduction to Networking Tools

- **Lecture 1:**
  - Overview of computer networks.
  - Introduction to basic networking hardware (cables, switches, routers, etc.).
  - Setting up a basic network using two computers (peer-to-peer).
- **Lecture 2:**
  - Introduction to networking commands (ping, tracert/traceroute, ipconfig/ifconfig).
  - Hands-on practice with network commands in Windows and Linux environments.

Week 2: OSI Model and Ethernet Cabling

- **Lecture 1:**
  - Understanding the OSI model: layers and their functionalities.
  - Demonstrating the use of packet capture tools like Wireshark for OSI layers.
- **Lecture 2:**
  - Ethernet cables and crimping.
  - Hands-on activity: Creating straight-through and crossover cables using RJ45 connectors.

Week 3: IP Addressing and Subnetting Basics

- **Lecture 1:**
  - Introduction to IP addressing (IPv4) and classes of IP addresses.
  - Calculating subnet masks and subnetting.
- **Lecture 2:**
  - Hands-on activity: Configuring IP addresses manually on a local network.
  - Verifying IP address configurations with ping and ipconfig/ifconfig.

Week 4: Local Area Networks (LANs) Setup

- **Lecture 1:**
  - Introduction to LANs: topology types (star, mesh, ring, etc.).
  - Configuring a small LAN using switches and routers.
- **Lecture 2:**
  - Hands-on: Setting up a basic LAN with multiple devices.
  - Testing communication between devices using ping and file sharing.

Week 5: Network Protocols

- **Lecture 1:**
  - Introduction to common network protocols (TCP, UDP, ICMP, DHCP, DNS, HTTP, HTTPS).
  - Protocol analysis using Wireshark.
- **Lecture 2:**
  - Hands-on: Capturing and analyzing network traffic with Wireshark.
  - Identifying different protocols in packet captures.

Week 6: DHCP and DNS Configuration

- **Lecture 1:**
  - Understanding DHCP: how it works and its role in network management.
  - Hands-on: Setting up a DHCP server in a lab environment.
- **Lecture 2:**
  - DNS basics and name resolution.
  - Hands-on: Configuring and testing a DNS server.

Week 7: Network Address Translation (NAT)

- **Lecture 1:**
  - Introduction to NAT and its importance in IP addressing.
  - Demonstrating different types of NAT (static, dynamic, PAT).
- **Lecture 2:**
  - Hands-on: Configuring NAT on a router.
  - Testing the NAT configuration by accessing external resources.

Week 8: Routing Fundamentals

- **Lecture 1:**
  - Introduction to routing concepts and how routers work.
  - Static vs dynamic routing.
- **Lecture 2:**
  - Hands-on: Configuring static routes on a router.
  - Verifying routes with traceroute and routing tables.

Week 9: Introduction to VLANs (Virtual LANs)

- **Lecture 1:**
  - VLAN concepts and benefits.
  - Overview of how VLANs segregate networks.
- **Lecture 2:**
  - Hands-on: Configuring VLANs on a switch.
  - Testing communication between devices on different VLANs.

Week 10: Dynamic Routing Protocols

- **Lecture 1:**
  - Introduction to dynamic routing protocols (RIP, OSPF, EIGRP).
  - Overview of routing tables and their importance.
- **Lecture 2:**
  - Hands-on: Configuring RIP or OSPF in a lab environment.
  - Analyzing how routes are dynamically updated.

Week 11: Wireless Networks

- **Lecture 1:**
  - Introduction to wireless networking concepts.
  - Setting up a wireless network with a router.
- **Lecture 2:**
  - Hands-on: Configuring and securing a wireless network.
  - Testing connectivity and troubleshooting wireless issues.

Week 12: Network Security Basics

- **Lecture 1:**
  - Overview of network security: firewalls, VPNs, encryption.
  - Understanding basic security concepts (WPA2, firewalls, port blocking).
- **Lecture 2:**
  - Hands-on: Configuring firewall rules on a network.
  - Testing firewall configurations with network traffic.

Week 13: Virtual Private Networks (VPNs)

- **Lecture 1:**
  - Introduction to VPN concepts and how VPNs work.
  - Overview of different types of VPNs (site-to-site, remote access).
- **Lecture 2:**
  - Hands-on: Configuring a simple VPN connection.
  - Testing VPN connectivity between remote locations.

Week 14: Troubleshooting Networks

- **Lecture 1:**
  - Common network troubleshooting techniques (ping, tracert, nslookup, etc.).
  - Using diagnostic tools for troubleshooting.
- **Lecture 2:**
  - Hands-on: Simulating network issues and troubleshooting them using the tools learned.

Week 15: Network Performance Monitoring

- **Lecture 1:**

    - Introduction to network performance metrics (bandwidth, latency, jitter, packet loss).
    - Overview of network monitoring tools (Nagios, PRTG, etc.).
- **Lecture 2:**
    - Hands-on: Monitoring network performance using tools like Wireshark and PRTG.
    - Analyzing network performance and identifying bottlenecks.

Week 16: Final Project

- **Lecture 1:**
    - Introduction to the final project: Setting up a fully functional network.
    - Project scope discussion: Include IP addressing, routing, DHCP, DNS, and security configurations.
- **Lecture 2:**
    - Hands-on: Implementing the final project.
    - Testing and presenting the final network setup to peers.
