iLabX—*The virtual Internet Laboratory*

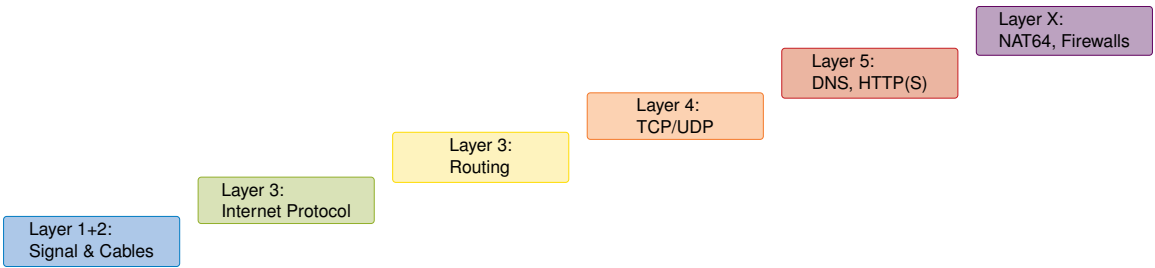
- **Combines gems from both courses:** essentials of iLab1 and iLab2
- Fully remote
- Two parts: self-paced online course *individual* and lab part *in teams of two*
- Open to many study programs, not restricted to Informatics department

iLabX
Self-Paced Part

- 6 Weeks: Self-paced part (tentative dates: mid July/August)
- At your own schedule:

Layer	1+2	Basics, Physics
Layer	3	IPv6, IPv4
Layer	3	Routing
Layer	4	TCP, UDP
Layer	5	DNS, HTTP(S)
Layer	6	Firewall, NAT64

iLabX
Content of the Self-Paced Online Course



Detailed Keywords for the Six Parts of the Course

Part 1 Signals and Cables

Signals, shared medium, physical medium, noise, addressing, topologies, unicast, broadcast, headers, payload, trailer, twisted pair, optical fiber, wireless, non-return to zero (NRZ), Manchester encoding, self-clocking.

Part 2 Internet Protocol

Internet Protocol (IP), IPv6, IPv4, subnetting, fragmentation, Stateless Address Auto Configuration (SLAAC), Neighbour Discovery Protocol (NDP), Internet Control Message Protocol (ICMP), static routing, forwarding, multicast.

Part 3 Routing

Dynamic routing, longest prefix matching, Autonomous System (AS), Open Shortest Path First (OSPF), Routing Information Protocol (RIP), Dijkstra, Bellmann-Ford, paths, loops.

Part 4 Transmission Control Protocol and User Datagram Protocol

Transmission Control Protocol (TCP), User Datagram Protocol (UDP), reliable communication, stateful communication, 3-way handshake, acknowledgements (ACK), piggyback, retransmission, congestion control, flow control.

Part 5 Domain Name System and Web Servers

Domain Name System (DNS), resolver, nameserver, zones, sub-domains, iterative vs. recursive name resolution, A and AAAA records, Hyper Text Transfer Protocol (HTTP), Transport Layer Security (TLS), HTTPS, virtual hosts.

Part 6 DNS64/NAT64 and Firewalls

Network Address Translation (NAT), DNS64, NAT64, state, address rewriting, IP 5-tuple, chains, filter, blacklisting, whitelisting, rules, firewall, tables.

iLabX
Block Part

- 4 Weeks: Block part (tentative dates: end of August to end of September)
- This part contains attestations, lectures, and labs
- Contents
  - IPv6
  - Dynamic Routing
  - BGP
  - Transport Layer
  - TLS and Filtering
  - WWW Security
- **Full time commitment required during block part!**

iLabX
What You'll Learn

- A full understanding of how the Internet works in its current version IPv6 and IPv4
- Basic knowledge about the Layered Architecture of the Internet
- Applied understanding of common Internet Protocols
- Applied understanding of common Internet Applications including DNS, NAT, and Firewalls
- Applied understanding of Internet security challenges and mitigation mechanisms

iLabX
Summary

- 10 ECTS lab course
- Online block course from July to end of September 2026
- No physical presence at TUM required
- Teams of 2
- Limited to 56 participants

100% Remote

https://www.net.in.tum.de/teaching/ss26/ilab_information.html#ilabx