

Course Specification Document

Title	Network Routing protocols
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Credits	5 ECTS
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Aims	This course aims to familiarize the student with the routing protocols in data networks and the Internet, detailing their mechanisms and studying them based on the type of network and the fundamental algorithm upon which the protocol is built. This enables the student to use routing protocols within the Autonomous System (ASs) and between ASs.
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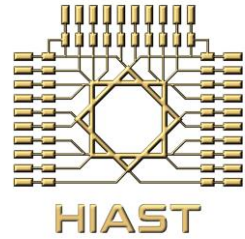
Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand the distance vector algorithm and the RIP protocol and its versions.
- Understand the Link-State method, and study the OSPF protocol and its versions.
- Understand the packet routing mechanism in the Internet between ASs and study the BGP protocol and how routing information is transferred between global routers.
- Understand multicast routing protocols and algorithms.
- Familiarize himself with the routing in some types of wireless networks.
- Use static routing configuration.
- Configure Dynamic Routing within the AS and between ASs.
- Determine and operate appropriate routing protocols for wireless networks.

Syllabus

- **Review of network addressing:** Recap of network addressing concepts, definition of address classes and their usage, classless addressing, supernetting and subnetting, static routing.
- **Graph theory and its purpose in routing:** Review of graph theory and its concepts, Dijkstra's algorithm, Bellman-Ford algorithm.
- **Distance vector routing protocols:** Routing using distance vector, "Counting to infinity" problem, Routing Information Protocol (RIP).
- **Link-State routing protocols:** Introduction to link-state routing algorithm, concepts of link-state advertisement, types of link-state advertisements, Open Shortest Path First (OSPF) protocol.
- **EIGRP protocol:** Definition of the EIGRP protocol, protocol uses and configurations, practical implementation.
- **Interdomain routing:** Introduction to interconnecting between the autonomous systems, nature of routing information between global routers, approaches and standards for extracting the best path, Border Gateway Protocol (BGP).



- **Multicasting and its tools and algorithms:** Concepts of multicasting (available addresses, joining and leaving a group within a network, routers responsible for multicasting, ..., etc), routing and transferring information of subscribers in multicasting groups, multicasting algorithms.
- **Routing in IPv6 networks:** Recap of IPv6 protocol, comparison of routing algorithms when using IPv6 and IPv4, multicasting in IPv6.
- **Routing in some wireless networks:** Routing protocols in Wireless Sensor Networks (WSN), routing protocols in Mobile Ad Hoc Networks (MANET).