Program and Rules

Redes de Comunicações II

**Licenciatura em
Engenharia de Computadores e Informática
DETI-UA**

Professors

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- Prof. Amaro de Sousa (practice classes)
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UC Informations

- All materials, documents and software will be available on eLearning.ua.pt (Moodle).
  - Subjected to weekly updates.

Flexible office hours
  - Email (to discuss any topic or schedule a meeting).
  - Discord: Invite https://discord.gg/bPPpKy5
    - **Change your nick to your real name** (First and Last names).
    - **Ask RC2 student role.**
    - Only after you will have access to the course contents.

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Objectives and Outcomes

- The objective of the course is to present students with:
    - Essential concepts in computer networks;
    - Identifying the fundamentals applied to the control and transport of data.
- It is intended that at the end the students should:
    - Have an understanding of the underlying fundamentals of communication networks;
    - Understand new technologies and concepts of communication networks;
    - Be able to use their knowledge to respond to current changes in communication networks.

Program

- Local Area Networks (LAN)
    - Virtual LAN: purpose, implementation, segmentation models, Layer 2 interconnection (802.1Q and VXLAN) and Layer 3 interconnection.
    - Spanning Tree-protocol(s).
- Network Design Models
    - Types of topology. Redundancy and resilience requirements. Hierarchical design model.
- IP Routing
    - Unicast Routing: static, dynamic and police based routing.
    - Internal Routing protocols (RIPv1/v2, OSPF, ISIS).
    - Internet general AS architecture and core networks. Inter-AS routing (MP-BGP).
    - Multicast Routing protocols (IGMP, MLD, PIM-DM, PIM-SM, PIM-SSM).
- Overlay Networks: IP-IP and GRE IP tunnels.
- Core Networks: SDH and DWDM. MPLS.
- (Other) Access Networks
    - CATV/HFC (DOCSIS), SDH/SONET/GPON,
    - Celular networks (4G/5G).
- Communication models: client-server and P2P.
- VoIP Service: SIP and WebRTC.
- Sensor Networks: BT, Zigbee, LoRA, NB-IoT.

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Evaluation

- Final Grade = 50% * Theory Grade + 50% * Practice Grade

  - There are no minimum grade for any component.

  - Theory grade

    - 1 Final Exam (50%) in the exam season;

    - and/or 1 Exam in "repeat exam" season;

    - The best grade is considered.

  - Practice Grade

    - 2 multiple choice tests (25%+25%)

      - During practice classes;

      - First test – April 8th, 12th;

      - Second test – May 31st, June 3rd.

    - "Repeat exam" season

      - One single test with all topics.

      - The best grade is considered.

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Planning (tentative)

	Semana	Teórica (6F-1.5h)		Prática (2h)	Prática (2F-2h)	Prática (6F-2h)	
1	12/Feb	Program and rules. Local Area Networks (LAN): Virtual LAN: purpose, implementation, segmentation models,				TP1	
2	19/Feb	Layer 2 interconnection (802.1Q and VXLAN) and Layer 3 interconnection. Spanning Tree-protocol(s).		TP1: Trabalho GNS3 com SWL3.	TP1/TP2	TP2	
3	25/Feb	Network Design Models: Types of topology. Redundancy and resilience requirements. Hierarchical design model. CLOS topology.		TP2: Access and Distribution Networks & Spanning-Tree	TP2	TP2	
4	04/Mar	IP Unicast Routing: static, dynamic and police based routing. Internal Routing protocols (RIPv1, RIPv2, OSPF, ISIS). PBR		TP2: Access and Distribution Networks & Spanning-Tree	TP3	TP3	
5	11/Mar	Network Design Models: Types of topology. Redundancy and resilience requirements. Hierarchical design model. CLOS topology.		TP3: Dynamic Routing	TP3	TP3	
6	18/Mar	IP Unicast Routing: static, dynamic and police based routing. Internal Routing protocols (RIPv1, RIPv2, OSPF, ISIS). PBR		TP3: Dynamic Routing	TP3	TP3	
7	25/Mar	Páscoa		Páscoa	Páscoa	Páscoa	
8	01/Apr	Overlay Networks: IP-IP and GRE IP tunnels.		TP3: Dynamic Routing + (Optional) Policy Based Routing	Páscoa	TP4	
9	08/Apr	Internet general AS architecture and core networks. Inter-AS routing. MP-BGP.		TESTE PRÁTICO	TESTE PRÁTICO	TESTE PRÁTICO	TP1+TP2+TP3
10	15/Apr	Internet general AS architecture and core networks. Inter-AS routing. MP-BGP.		TP4: IPv4 tunnels. IPv6 over IPv4 tunneling.	TP4	TP4	
11	22/Apr	Semana académica		Semana académica	Semana académica	Semana académica	
12	29/Apr	Communication models: client-server and P2P. VoIP Service: SIP and WebRTC.		TP4: IPv4 tunnels. IPv6 over IPv4 tunneling.	TP4/TP5	TP5	
13	06/May	Traffic Engineering (TE). Multiprotocol Label Switching (MPLS)		TP5: MPBGP	TP5	TP5	
14	13/May	IP Multicast Routing: protocols (IGMP, MLD, PIM-DM, PIM-SM, PIM-SSM).		TP5: MPBGP	TP5	TP5/TP6	
15	20/May	Core Networks: SDH/SONET and DWDM. (Other) Access Networks: CATV/HFC (DOCSIS), SDH/SONET/GPON, Celular networks (4G/5G). Sensor Networks: 802.15.4, BT, Zigbee, LoRA, NB-IoT+Thread.		TP5: MPBGP	TP5/TP6	TP6	
16	27/May	Revisions.		TP6: VoIp (SIP)	TP6	TESTE PRÁTICO	TP4+TP5+TP6
17	03/Jun			TESTE PRÁTICO	TESTE PRÁTICO		

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Bibliografy

- **Theoretical classes slides.**

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- Computer Networking: a Top-Down Approach, Kurose J., Ross K., 7th edition, Addison Wesley, ISBN-13: 978-9332585492, 2017

- Designing for Cisco Network Service Architectures (ARCH), Marwan Al-shawi, Andre Laurent, Cisco Press, 4th edition, ISBN-13: 978-1587144622, 2016.

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