

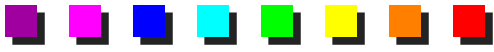


Protocolli e Architetture di Routing A.A. 2017/2018

Fulvio Riso, Ivano Cerrato

<http://par.frisso.net>

<http://fulvio.frisso.net>



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Lecturers

- In-class lectures
 - Fulvio Rizzo (fulvio.rizzo@polito.it)
- Labs and exercises
 - Ivano Cerrato (ivano.cerrato@polito.it)

- Please get in touch with the right person!





Course mission

This course presents the most important algorithms and routing protocols used in modern networks. Additional topics include: (1) the architecture of modern network devices; (2) a brief insight of the problem of processing traffic inside a network device; (3) software defined networks and beyond.



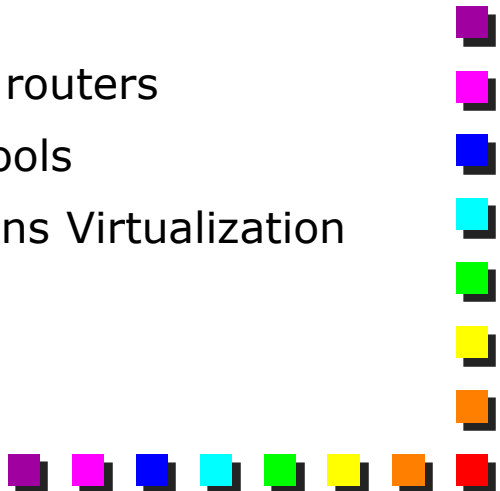


Course outline

■ Routing

- Routing and Forwarding algorithms
- Distance Vector and Link State
- Hierarchical and inter-domain routing
- RIP, IGRP/EIGRP, OSPF, BGP
- Multicast routing
- IPv6 routing

■ Network processing

- Architecture of some commercial devices
 - Introduction to the processing issues in network routers
 - Introduction to packet processing libraries and tools
 - Software-Defined Networks and Network Functions Virtualization
- 



Prerequisites

- IP and the most important protocols of the TCP/IP suite
 - ARP, IP, DNS, TCP, UDP
- Packet sniffing with respect to the above protocols
 - A full set of exercises is available on the website
- IP addressing, IP network design
 - A full set of exercises is available on the website
- Static routing on IP networks
 - A full set of exercises is available on the website

The student is required to check that he is OK with those exercises; if not, he has the responsibility to fill his gaps by himself.





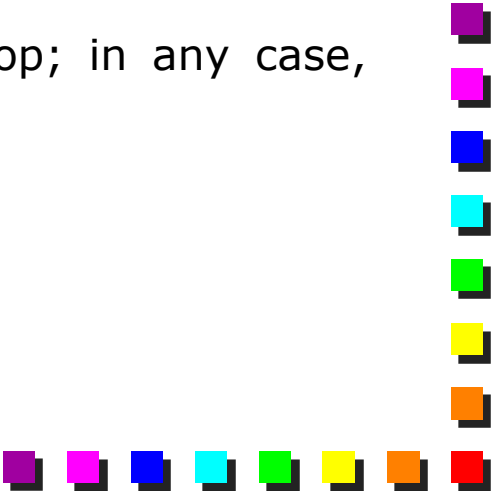
Teaching organization

- Some in-class exercises
- Some additional exercises are provided
 - Student should complete them on their own
 - Closed-answer questions available as well
- Lab topics
 - Most important routing protocols (RIP, OSPF, BGP)
 - Packet processing
- Check the schedule of the lab on the calendar



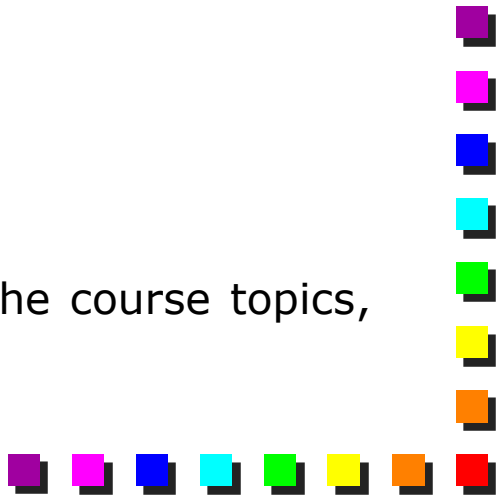


Labs and exercises

- Not compulsory, but definitely needed to pass the exam
 - We expect students to complete their duties timely
 - **Not at the end of the semester!**
 - Lab logistics
 - We will provide a fully configured VM with all the required tools for all the labs
 - DynNG no longer used
 - The VM can be either copied on a USB stick and used to boot your laptop, or executed in Virtualbox
 - Better if the student comes with his own laptop; in any case, LADISPE machines should be available as well
 - The course website provides:
 - The text of each assignment
 - Resources about how to configure Cisco routers
- 



Schedule

- 6+ hours/week
 - (hopefully) some spare hours at the end of the semester
 - No fixed schedule for class/lab
 - Depends on what we have to do
 - Please check the online calendar week after week
 - Some additional lectures during the period
 - Lab: LADISPE or classroom
 - We are still evaluating the best option
 - Lab Hours = Consultancy Hours
 - Please use those hours for having hints about the course topics, exercises, homework, lab, etc
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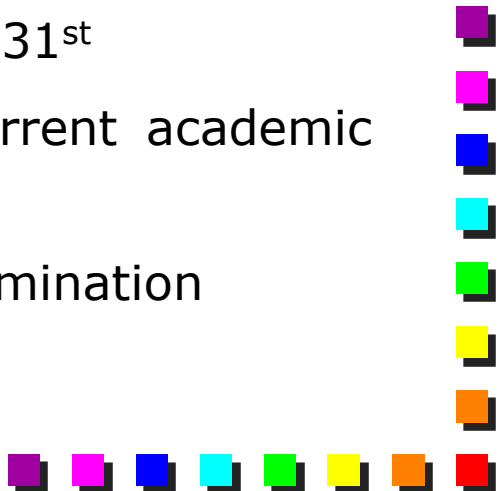


Exams rules (NEW!): Option 1

- Written exam (max grade = 30)
 - A mixed set of open-answer questions, multiple-choice questions, and exercises
 - To achieve the maximum grade, you need to have studied the subject **and** be able to reach some new results on your own
 - This means, just studying is not enough
 - Oral examination in case few students are present
 - Possibility to ask for an **additional** oral session if mark ≥ 26
 - Usually, only **one** question



Exams rules (NEW!): Option 2

- The same as Option 1 plus a **public** talk about a scientific paper, that counts for 0-4 points, added to the outcome of the exam
 - Topic: a scientific paper of about 12 pages
 - Not available for everyone
 - More in the next slides
 - Please don't expect the maximum grade for everybody: it is likely that most people will get less than the 4 points
 - To be given at any time, but before 2017, Jan 31st
 - Awarded grade will be valid only for the current academic year
 - The student can no longer ask for the oral examination
- 



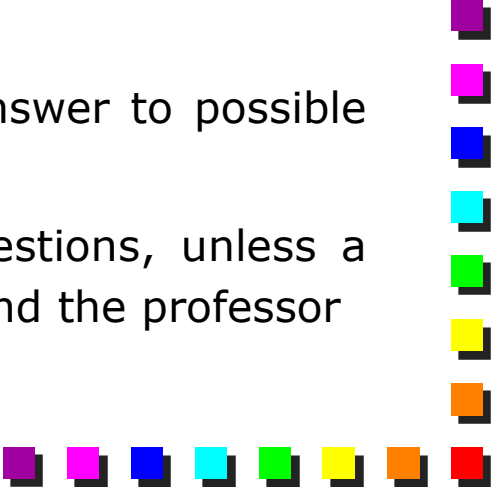
Exams rules (NEW!): Option 3

- Personal project, replacing the exam
 - About 3 weeks full-time
 - Eligible students must have an *average mark* ≥ 27
 - To be completed within the end of the semester
- List of possible topics available on the course website





More about Option 2

- Why: books are ok for well-known topics; papers are needed if we need to address “cutting-edge” topics
 - How: each student chooses a paper from a public list available on the website
 - Assignment in FIFO order (contact Ivano C.)
 - Each student should
 - Read and understand the paper
 - Be able to summarize the topic and present the content to a technical audience
 - Be critic with the paper, and be prepared to answer to possible questions from the public
 - Present the paper in 20 minutes + 10 for questions, unless a different timing is agreed between the student and the professor
 - Do not underestimate how difficult this is!
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Option 2: some suggestions (1)

- Time is really limited

Your work is excellent not when it is perfect, but when it is the best result you can achieve given the constraints you have

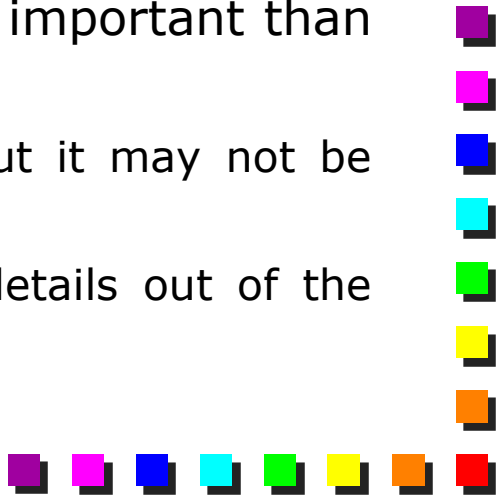
- The “meat” allows you to survive, but the “beauty” makes you feel better
 - Make your presentation appealing!

- **Give the talk to a “friendly” audience before going public**





Option 2: some suggestions (2)

- Suggested outline
 - Background
 - Addressed problem
 - Proposed solution
 - Validation
 - Comments (Was it correct? Any flaws?)
 - Conclusions
 - Usually one slide/minute
 - Math is important, but results are much more important than math
 - Math may be needed to achieve the result, but it may not be need to understand what has been proposed
 - Focus on what matters, leaving unimportant details out of the presentation
- 



How the talk will be evaluated

- Technical content and organization of the topics
- Presentation
 - Graphical layout, correctness of the text (e.g., no typos)
 - Capability to keep the interest of the audience
 - Capability to explain the topic
 - Capability to stay in the assigned timeslot
- Capability to answer to the questions





Exams schedule

- Two exams sessions in winter
 - End Jan
 - Feb
- One exam in July
- One exam in September





Students who were enrolled in the past

- The general outline is the same over the years
- However, we will put more emphasis on new topics, such as SDN, NFV, network programming





Textbooks (1)

- **J. Doyle, Routing TCP/IP (volume 1)**

- <http://www.amazon.com/Routing-Professional-Development-Certification-Training/dp/1578700418>
- Volume 2 for BGP, IPv6, management, etc

- C. Huitema, Routing in the Internet (2nd edition)

- <http://www.amazon.com/Routing-Internet-2nd-Christian-Huitema/dp/0130226475>

- G. Varghese, Network Algorithmics

- <http://www.amazon.com/Network-Algorithmics-Interdisciplinary-Designing-Networking/dp/0120884771>





Textbooks (2)

- But...

- Do not cover all the topics
- Please take your own notes in class

- The professor strongly suggests to buy a book if you are interested in those topics





Logistic (1)

- Course website
 - <http://par.frisso.net>
- Day-by-day calendar
- Online slides
 - Available (hopefully) before the class

! Warning !

! Slides are not enough !

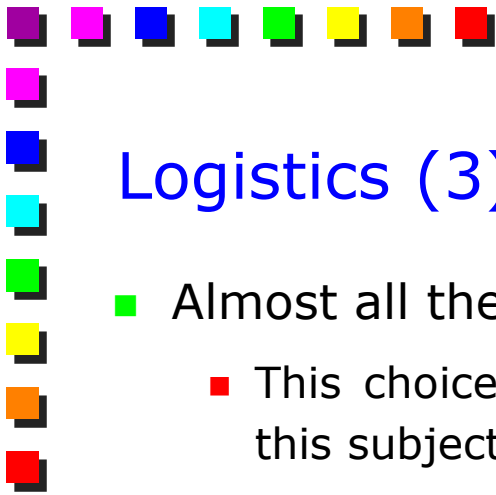
! Exercises and labs are very important !





Logistic (2)

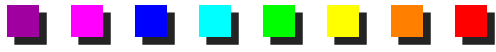
- Class live recording (on <http://didattica.polito.it/>)
 - For who cannot attend to the class
 - Done on “best effort” basis
 - No guarantees, e.g., when the professor’s laptop crashes
 - Online publication may be delayed for some days
 - **Volunteers needed!**
- Prof. hours for consultancy
 - Before/after the class
 - Face-to-face meetings
 - Check for “rules” on the professor’s website:
 - <http://fulvio.frisso.net>



Logistics (3)

- Almost all the documentation is in English
 - This choice aims to help foreign students who are interested in this subject
- Classes will be in Italian
- The exam will be in Italian

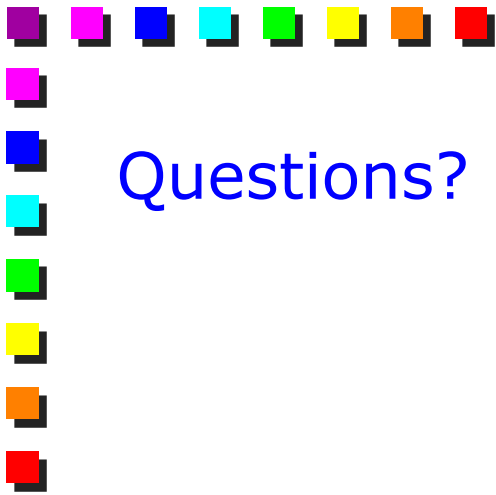




Auto-learning lectures

- Due to budget constraints, we have 12 hours in auto-learning mode
- The advantage is that we have more lab hours
- Available on the “Portale della didattica”, as usual





Questions?

