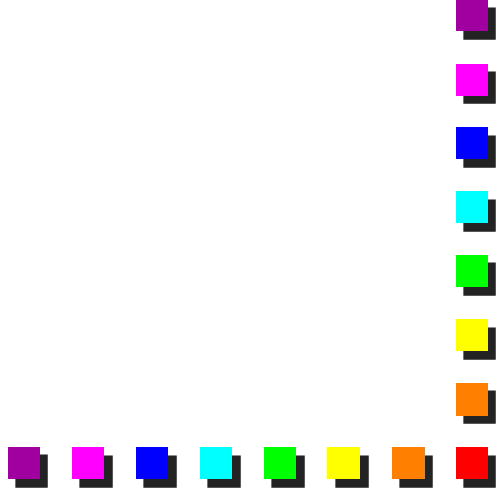




# Protocolli e Architetture di Routing A.A. 2016/2017

Fulvio Riso, Roberto Bonafiglia

<http://par.frisso.net>  
<http://fulvio.frisso.net>





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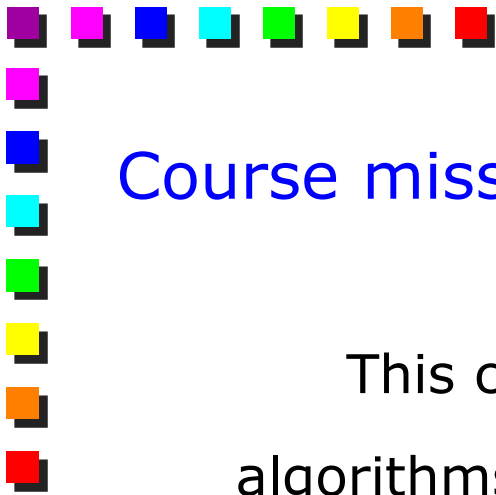




## Lecturers

- In-class lectures
  - Fulvio Riso ([fulvio.riso@polito.it](mailto:fulvio.riso@polito.it))
- Labs and exercises
  - Roberto Bonafiglia ([roberto.bonafiglia@polito.it](mailto:roberto.bonafiglia@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 the architecture of modern network devices, and a brief insight of the problem of processing traffic inside a network device.



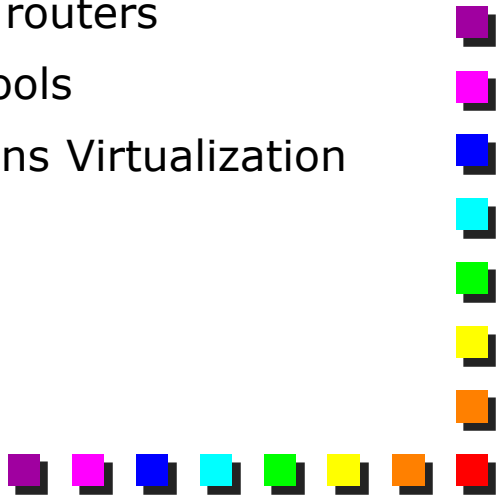


# Course outline

## ■ Routing

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





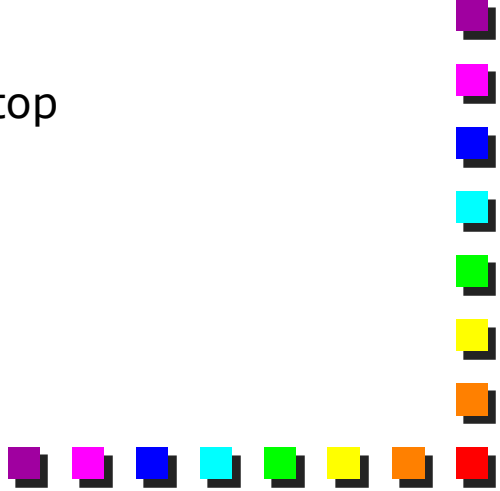
## Teaching organization

- 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 disk and used to boot your laptop, or executed in Virtualbox
    - We expect the student to come with his own laptop
  - The course website provides:
    - The text of each assignment
    - Resources about how to configure 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
- 



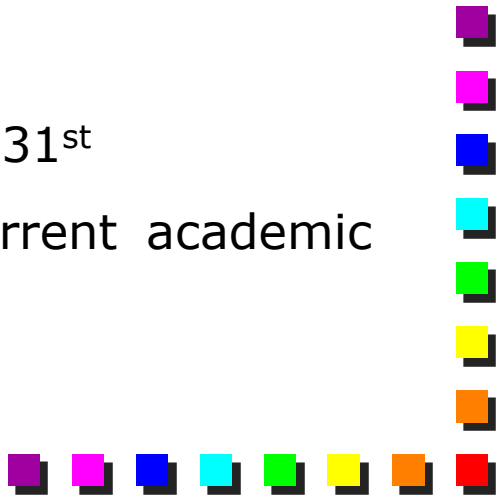
## Exams rules (NEW!): Option 1

- Written exam with max grade = 27
    - 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  $\geq 24$ 
      - Usually, only **one** questions
  - Note: the exam will still be evaluated in the 0-30 range, then, if the outcome is positive ( $\geq 18$ ), the grade will be re-scaled to max 27
    - $(\text{grade}-18) + (\text{grade}-18) * (9/12)$
- 





## Exams rules (NEW!): Option 2

- The same as Option 1 plus a **public** talk about a scientific paper, that counts for 0-6 points
    - Topic: a scientific paper of about 12 pages
    - Not available for everyone
    - More in the next slides
  - Please don't expect 6 points to everybody: very likely, most of the people will get far less than 6 points!
  - To be given at any time, but before 2017, Jan 31<sup>st</sup>
  - Awarded grade will be valid only for the current academic year
- 



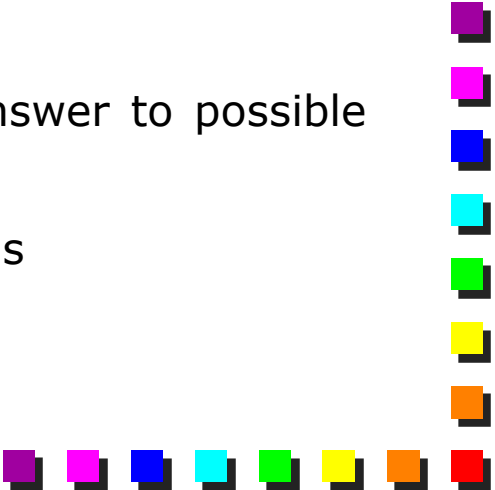
## Exams rules (NEW!): Option 3

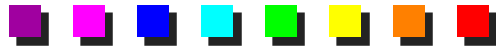
- Personal project, replacing the exam
  - About 3 weeks full-time
  - Eligible students must have an *average mark*  $\geq 27$
  - To be completed within the end of the semester
- List of possible topics available on the course website





## 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 Roberto B.)
  - 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 + 5 for questions
      - Do not underestimate how difficult this is!
- 



## 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*

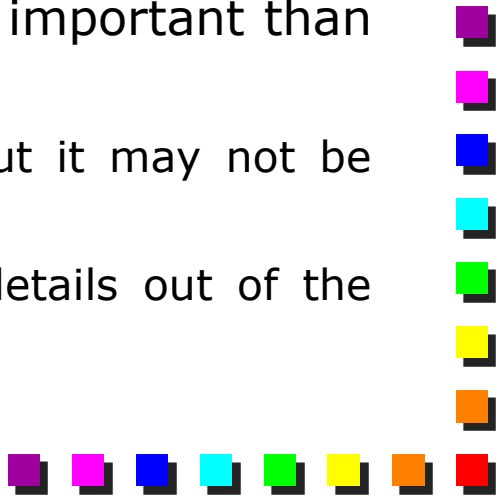
- The “meat” allows you to survive, but the “beauty” makes you feel better
  - Make your presentation appealing!

- **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

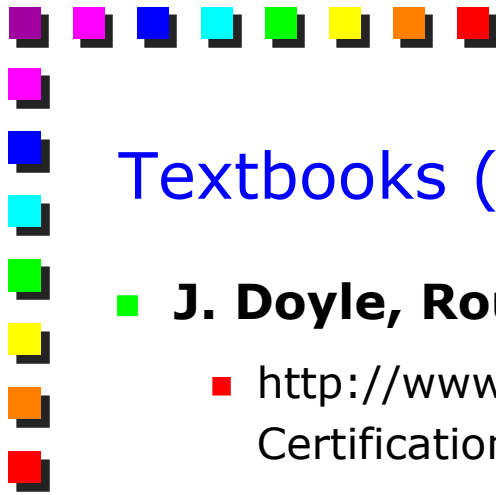




## Students who were enrolled in the past

- The outline of the course is almost unchanged from the previous years
- You can keep the rules valid in your year





## 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 !

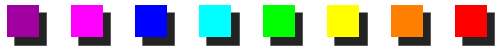
! Exercises and labs are very important !





## 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 this year we have more lab hours
- Available on the “Portale della didattica”, as usual



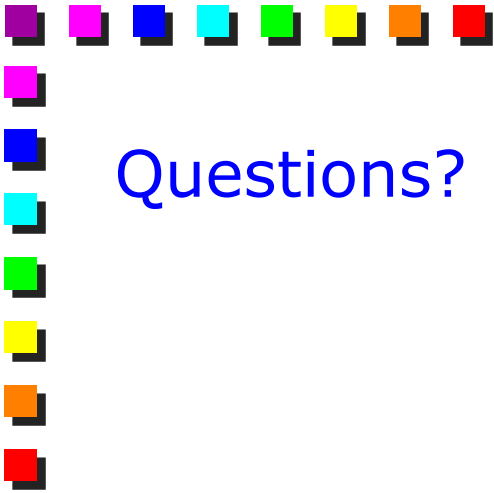




## And finally... a plus: Cisco CCNA

- This course has a strong relationship with the Cisco CCNA program
    - First level of certification for Cisco
  - Good students will end with an excellent background on theory and exercises
  - Work do to mainly with respect to practical Cisco configurations
  
  - A CCNA certification may require a reasonable effort at this point
    - Some student may have a look at this
- 





Questions?

