



1014I – Communication systems and cybersecurity (2025/26)

## Outline of the course

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## Practical information

- **Teacher's email address:** giacomo.bacci@unipi.it
- **Teaching material:** available on the repository on the Teams channel and on [https://people.unipi.it/giacomo\\_bacci/](https://people.unipi.it/giacomo_bacci/)
- **Communications to students:** available on the Teams channel
- **Exam:**
  - project (see next slide)
  - oral mode, subscriptions via customary channels
- **Reference material:** bibliography available at the end of each lecture
- **Schedule:** on Tuesdays, 8<sup>45</sup> – 10<sup>00</sup>, 10<sup>15</sup> – 11<sup>30</sup>  
on Wednesdays, 8<sup>45</sup> – 9<sup>35</sup>, 9<sup>40</sup> – 10<sup>30</sup>

## Course project

- The project is **part of the exam**: it must be **successfully completed and discussed** before the oral exam
- The project can be carried in groups of **two students** (note: presentation will be **per person**)
- The topic of the project is chosen among a set of **six topics**:
  - **1: Full-duplex capacity**
  - **2: Quadrature-amplitude modulation (QAM) capacity**
  - **3: Phase noise effect over the capacity of a radio link**
  - **4: Interleaving comparison on same-rate error correcting codes**
  - 5: Image compression using wavelets
  - 6: Encryption using advanced encryption standard (AES)
- **10 hours** of lecturing will be dedicated to developing the project
- In addition to the presentation, some simulations need to be carried out in order to support the experimental findings; both **Matlab** and **python** can be used
- Some selected topics will be presented at **Nokia Italia**'s premises (Milan, Italy) at the end of June 2026



## Outline of the course

- A primer on digital communication systems: main building blocks (1.5 CFU)  
**G. Bacci**
- Wireless technologies for access networks: 4G and 5G standards (2 CFU) –  
**G. Bacci**
- Wired technologies for access and transport networks: fiber optics and xDSL (1.5 CFU) –  
**G. Bacci, M. Di Dio**
- Project development (1 CFU)  
**G. Bacci, I. Chafaa, Nokia's staff**

