

COM-405

**Mobile networks**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Communication systems minor	H	Opt.
Computer science	MA1, MA3	Opt.
Cybersecurity	MA1, MA3	Opt.
Electrical and Electronical Engineering	MA1, MA3	Opt.
Robotics, Control and Intelligent Systems		Opt.
SC master EPFL	MA1, MA3	Obl.

Language of teaching	English
Credits	8
Session	Winter
Semester	Fall
Exam	Written
Workload	240h
Weeks	14
<b>Hours</b>	<b>7 weekly</b>
Courses	3 weekly
Exercises	2 weekly
Lab	2 weekly
<b>Number of positions</b>	

**Summary**

This course provides a detailed description of the organization and operating principles of mobile and wireless communication networks, as well as the use of wireless signals for sensing and imaging.

**Content**

- Introduction to wireless networks
- Wireless PHY Layer Techniques
- MAC (Medium Access Control) Layer Protocols
- Wi-Fi & Bluetooth
- Cellular networks (3G, 4G, 5G).
- Internet of Things (IoT) Networks and Technologies.
- Multi-Hop Networks, Mesh Networks, and Sensor Networks
- Routing in Wireless Networks
- Network Coding
- Cross Layer Networking
- Wireless Localization
- Wireless Sensing
- Wireless Imaging

**Keywords**

Communication networks, protocols, wireless, IoT

**Learning Prerequisites****Required courses**

CS-202 Computer systems or COM-208 Computer Networks  
COM-302 Principles of Digital Communications

**Recommended courses**

COM-430 Modern Digital Communications: A Hands-on Approach

**Important concepts to start the course**

Operating principles of communication protocols and layer organization.

### Learning Outcomes

By the end of the course, the student must be able to:

- Synthesize the way a mobile network operates
- Interpret the behavior of such networks
- Propose evolutions to existing protocols
- Identify weaknesses and bottlenecks

### Teaching methods

Lectures  
Weekly Readings  
Exercise sessions  
Homework Problems  
Labs

### Expected student activities

Class Participation, Quizzes, Homework, Labs, Exercise Sessions

### Assessment methods

Homeworks  
Quizzes  
Labs  
Final exam

### Supervision

Office hours	No
Assistants	Yes
Forum	No

### Resources

#### Virtual desktop infrastructure (VDI)

No

### Bibliography

Handouts, recommended books (see course URL)

### Ressources en bibliothèque

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### Moodle Link

- <https://go.epfl.ch/COM-405>