DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

UNIVERSITÀ
DEGLI STUDI
DI PADOVA

What is ICT?

Information and Communication Technology

systems (hardware and software) for transmitting, sharing, and processing information

Communication Technologies

Cybersystems

Research & Innovation

MIME

curricula

Multimedia

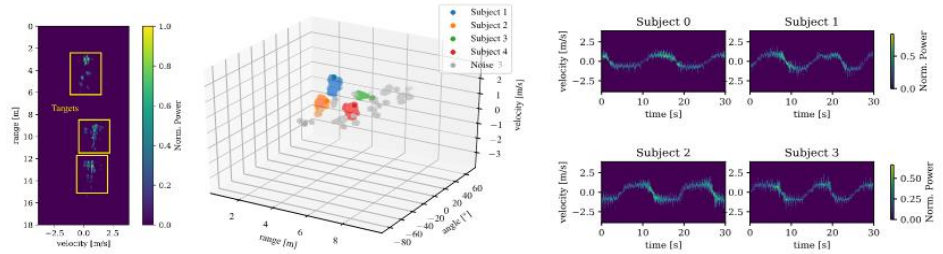
ICT for Life and Health

ICT is pervasive

- Internet, Web browsing, home-banking, smart home appliances…
- Streaming/multimedia: YouTube, Twitch, PrimeVideo, Instagram, Netflix...
- Emails, mobile calls, GPS…

But this is only the tip of the iceberg...

Future ICT: applications

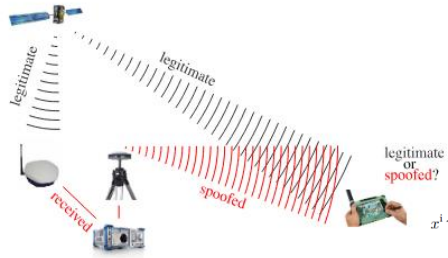


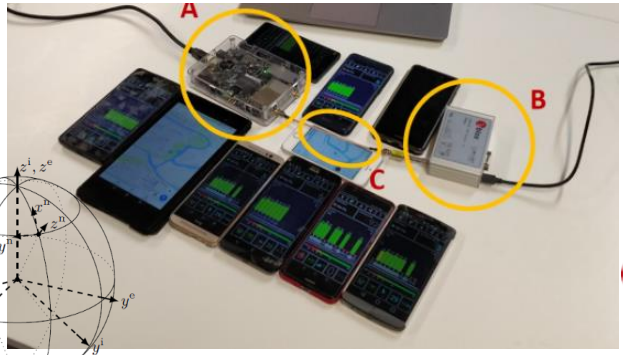
Virtual and Augmented Reality

IoT: Smart Cities and Industry 4.0

Autonomous Driving

Mobile Network Security





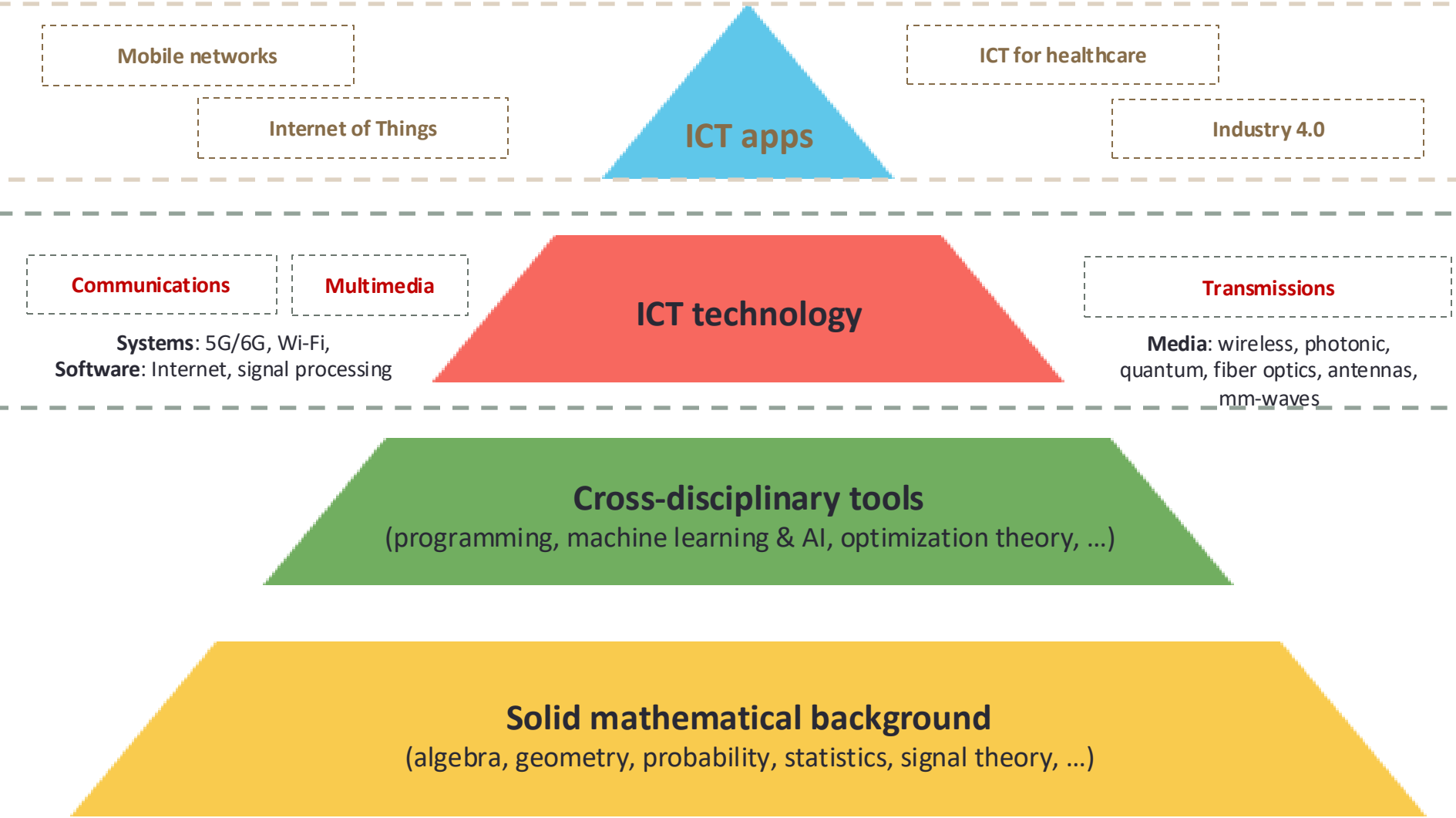
Future ICT: technical enablers

- **Multi-access Edge Computing:** edge assisted communications at the network edge (5G/6G)
- **Multimedia:** knowledge extraction from videos, point-clouds, etc.
- **New communication paradigms:** intelligent reflecting surfaces, underwater communications, massive MIMO, joint communication and sensing (radar-type functionalities)
- **Machine-learning & decision making** for Internet networks
- **Cybersecurity:** quantum security, quantum Internet
- …

Growing factors of ICT

- Is it a strong/growing market?
  - **YES**
  - Worldwide: worth **$5.52** trillion in 2024, **5.2%** CAGR
  - Europe: worth **$1.65** trillion in 2024, **3.7%** CAGR
  - Italy: **$74.01** billion in 2023, **9.2%** CAGR (2023-2028), to reach **$113.9** billion
- **Main growing factors**
  - Digital transformations: businesses across all sectors to increase operational efficiency and gain competitive edge
  - Internet of Things: due to the rapid adoption of IoT devices from smart appliances (washing machines, TVs, refrigerators, smart illumination, connected via GoogleHome, Alexa, etc.) to industrial sensors → these generate *massive amounts of data* to be analyzed (edge *vs* cloud)
  - 5G (and beyond) connectivity: high speed and low delay, enable new applications such as virtual/augmented reality realtime remote surgery…
  - Emerging technologies: Innovations in areas such as AI, blockchain, and quantum communications and computing are opening up new frontiers in the ICT industry, driving research and development efforts + creating new market opportunities

The modern ICT engineer



MIME

- A modern & flexible Master's Degree (2 years)
- Centered on
  - ICT **tools**, **technology** and **applications**
  - With an eye on **modern ICT systems**
    - 5G/6G mobile networks, Internet of Things,
    - Industry 4.0, virtual/augmented reality, e-health, …
- Allows you to shape your study path along three axes
  - Type of technology: communications, multimedia, TX media
  - Cross-disciplinary tools: programming, machine learning, optimization
  - Application domain: mobile nets, Internet, IoT, e-health, …

STUDY PATHS

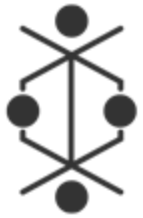
4+1 CURRICULA

Communication Technologies

Multimedia

Cybersystems

ICT for Life and Health



Research & Innovation

Introduced in 2024

- 6 **Mandatory** courses
- 3 **Core** courses from a list (choice amongst 10-12)
- 3 **Related** courses from a list (choice amongst 9-12)
- 2 **Free** courses
- 1 **Research Training** or **Internship** (9 ECTS)
- 1 **Final Thesis** (21 ECTS)

Degree taught entirely in English

C1-C4

- **C1 – Communication Technologies**
  - Fiber optics, wireless communications, multiantenna systems (MIMO), intelligent reflecting surfaces, quantum communications
  - Mobile networks (5G/6G), Wi-Fi, underwater & satellite networks
- **C2 – Cybersystems**
  - Internet networks and protocols, cybersecurity
  - Wi-Fi, Internet of Things, industrial communication
- **C3 – Multimedia**
  - Machine learning and AI for point cloud/video analysis
  - Videos/images analysis/processing, transmission over networks
- **C4 – ICT for Life & health**
  - Processing and transmission of human and biological signals
  - Human data analysis (often via ML/AI techniques)

C1 Communication technologies core subjects

6 Mandatory courses (36 ECTS)

- Antennas
- Neural Nets & Deep Learning
- Digital Communication
- Mobile Communications
- Wireless Networks
- Multimedia Communications

3 courses among (18 ECTS)

- Advanced Wireless Systems
- Fiber Optics
- Information Security
- IoT & Smart Cities
- Machine Learning
- Millimeter-wave Devices
- Nanophotonics & Metasurfaces
- Optical & Quantum Communications
- Optical Networks
- Photonics & Remote Sensing
- ModernC++ Programming for ICT
- Satellite Communication & Space Technologies

C1 Communication technologies cross-disciplinary subjects

1 course among (6 ECTS)

- Convex Optimization
- Cryptography
- Optimization Methods for ICT
- Physics & Optics at nanoscale
- Quantum information & computing
- Reinforcement learning

2 courses among (12 ECTS)

- Industrial communications
- Programmable hardware devices
- Quantum methods for ICT
- Quantum optics & lasers
- Quantum technologies

C2 Cybersystems core subjects

6 Mandatory courses (36 ECTS)

- Fiber Optics
- Digital Communications
- Multimedia Communications
- IoT & Smart Cities
- Stochastic Processes
- Network Modeling

3 Core courses (18 ECTS)

- Advanced Network Analysis
- Antennas
- Digital & Interactive Multimedia
- Digital Forensics & Biometrics
- Game Theory
- Information Security
- Machine Learning
- Mobile Communications
- Network Science
- Neural Nets & Deep Learning
- Quantum Cryptography & Security
- Wireless Networks

C2 Cybersystems
cross-disciplinary subjects

1 course among (6 ECTS)

- Convex Optimization
- Cryptography
- Optimization Methods for ICT
- Quantum information & computing
- Reinforcement learning

2 courses among (12 ECTS)

- Big Data Computing
- Cyber physical Systems & IoT Security
- Foundation of Databases
- Industrial communications
- Sensing & Measurement Systems
- Web Applications

C3 Multimedia core subjects

6 Mandatory courses (36 ECTS)

- IoT & Smart Cities
- Computer Vision
- Digital Communications
- Optimization Methods for ICT
- Neural Nets & Deep Learning
- 3D Vision & eXtended Reality

4 Core courses (24 ECTS)

- Advanced Multimedia Systems
- Adversarial Machine Learning
- Digital & Interactive Multimedia
- Digital Forensics & Biometrics
- Digital Signal Processing
- Information Security
- Machine Learning
- Machine Learning for Human Data
- Multimedia Communications
- Network Modeling
- Network Science
- Photonics & Remote Sensing
- Stochastic Processes
- Wireless Networks

C3 Multimedia
cross-disciplinary subjects

2 course among (12 ECTS)

- Big Data Computing
- Computer Engineering for Music & Multimedia
- Cryptography
- Foundation of Databases
- Natural Language Processing
- Reinforcement Learning
- Web Applications

C4 ICT for Life & Health

6 Mandatory courses (36 ECTS)

- IoT & Smart Cities
- Computer Vision
- Optimization Methods for ICT
- e-Health
- Neural Nets & Deep Learning
- Bio electromagnetism

4 Core courses (24 ECTS)

- 3D Vision and eXtended Reality
- Advanced Multimedia Systems
- Advanced Network Analysis
- Biophotonics
- Digital & Interactive Multimedia
- Digital Forensics & Biometrics
- Game Theory& Strategic Behavior
- Machine Learning
- Machine Learning for Human Data
- Multimedia Communications
- Network Modeling
- Network Science
- Secure Digital Healthcare
- Stochastic Processes

C4 ICT for Life & Health cross-disciplinary subjects

2 course among (12 ECTS)

- Life Data Epidemiology
- Foundation of Databases
- Computational Genomics
- Natural Language Processing
- Physical Models of Living Systems
- Sports Engineering & Rehabilitation Devices

C5 Research & Innovation

3 Mandatory – choose 3 out of 4

- Digital communications
- Fiber optics
- Wireless Networks
- Computer vision

Technology-oriented foundational

3 Mandatory – choose 3 out of 4

- Game theory
- Network Modeling
- Stochastic processes
- Electromagnetic theory and methods

Math-oriented foundational

C5 Research & Innovation

Project-based courses – choose 2 out of 4

- Optical Networks
- Advanced wireless systems
- Advanced network analysis
- Advanced multimedia systems

Research & lab. oriented

1 core course from the entire MIME offer
3 courses amongst cross-disciplinary subjects (see list)
2 free courses

1 research training or internship (9 ECTS)
1 final thesis project (21 ECTS)

C5 Research & Innovation cross-disciplinary subjects

1 course among (6 ECTS)

- Convex Optimization
- Optimization Methods for ICT
- Quantum Optics & Laser

2 courses among (12 ECTS)

- Big Data Computing
- Computer Engineering for Music & Multimedia
- Cryptography
- Industrial Communications
- Natural Language Processing
- Physics & Optics at the nanoscale
- Quantum Methods for ICT
- Quantum Information & Computing
- Reinforcement Learning

Example: Cybersystems

- Fiber Optics
- Digital Communications
- Multimedia Communications
- IoT & Smart Cities
- Stochastic Processes
- Network Modeling

mandatory
36 credits

- Advanced Network Analysis
- Antennas
- Digital and Interactive Multimedia
- Digital Forensics and Biometrics
- Game Theory
- Information Security
- Machine Learning
- Mobile Communications
- Network Science
- Neural Networks and Deep Learning
- Quantum Cryptography and Security
- Wireless Networks

choose 3
18 credits
(core subjects)

Cross-disciplinary subjects

- Convex optimization
- Cryptography
- Optimization Methods for ICT
- Quantum Information and Computing
- Reinforcement Learning

choose 1
6 credits
(elective)

- Big Data Computing
- Cyber Physical Systems & IoT Security
- Foundations of Databases
- Industrial Communications
- Sensing and Measurement Systems
- Web Applications

choose 2
12 credits
(elective)

- Free choice
- Free choice

choose 2
12 credits

- English B2 + Soft Skill Training

6 credits

- Internship
- Research training

choose 1
9 credits

- Thesis

21 credits

Total: 120 credits

INTERNSHIPS

Sony Eutec
STUTTGART (DE)

Multimedia R&D

Fiat Chrysler Automobiles
TURIN / USA

5G vehicular communications

Huawei
MILAN / CHINA

Cellular networks R&D

Policlinico Sant'Orsola
BOLOGNA

Infectious diseases unit

World Sensing
BARCELONA (ES)

Wireless sensors monitoring

RFI
MESTRE (VE)

Railway network

Telenor
OSLO (NO)

National telco operator

CAME SpA
DOSSON DI CASIER (TV)

Safe access

Infineon
PADOVA / AUSTRIA

Semiconductors and IoT

Hewlett Packard
BOLZANO VICENTINO (VI)

Software defined networking

INTERNATIONAL BY DESIGN

A truly multicultural environment

English as first and only language

International students typically coming from 30+ countries across 5 continents

Mobility programs

- You can choose:
  - Erasmus+ to study in EU countries
  - SEMP to study in Switzerland
  - Ulisse program to study in Europe, America, Asia and Oceania
  - DECAMP virtual mobility as a partnership of European universities
  - Double Degree programs with **Universidad Politécnica de Madrid** and **National Taiwan University**
  - TIME double degree programs with **Danmarks Tekniske Universitet**, **Universitat Politècnica de Cataluña**, **Universidade de Lisboa**, **Université Catholique de Louvain** and **Yokohama University**.

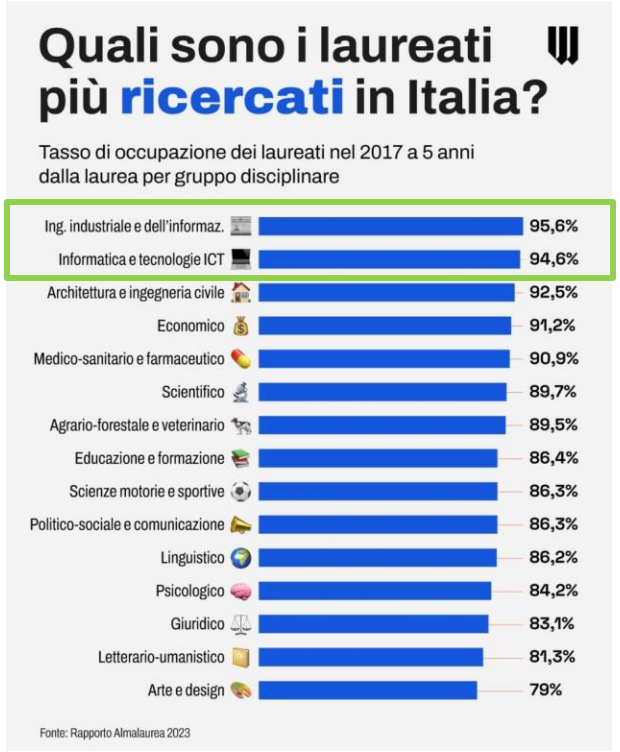
STATISTICS

occupation perspective, satisfaction, …

Some figures from AlmaLaurea

- Average duration of studies: 2.6 years
- Average graduation mark: 103.6
- Had an experience abroad: 10.8%
- Got a scholarship: 43.4%
- Internships at companies: 45.8%
- Overall satisfaction: **97.6%**
- Teaching satisfaction: 97.6%
- Would enroll again: **86.7%**

some numbers from AlmaLaurea



After graduating (AlmaLaurea)

- 23% enter a Ph.D. program
- **91% are employed after 1 year**
- Average time from graduation to 1st job: 1.7 months
- Total unemployment rate: 7.1%
- Monthly salary after 1 year: 1573€
- Permanent positions after 1 year: 42.3%
- Monthly salary after 5 years: 2143€
- Permanent positions after 5 years: 80%

https://www.almalaurea.it/i-dati/tutti-i-dati

Job Opportunities

Job opportunities after graduation, by MIME alumni:
https://shorturl.at/ya1Fq

ADMISSION PROCEDURE

Admission

- Holders of Italian degree ≥ 84/110 with at least 50 ECTS credits in:
  - maths (MAT/02, MAT/03, MAT/05, MAT/06)
  - physics (FIS/01)
  - computer science (INF/01, ING-INF/05)
  - telecommunications (ING-INF/02, ING-INF/03)

Direct access for graduates with a Bachelor degree in Information Engineering, Maths, Physics, Computer Science

FURTHER INFO & CONTACTS

Email: mime@dei.unipd.it
Website: https://mime.dei.unipd.it




DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

1222 · 2022 800 ANNI

UNIVERSITÀ DEGLI STUDI DI PADOVA