# PhD in Information and Communication Technology for Health

# Università degli Studi di Napoli Federico II

# Module Title: 5G in Telemedicine and eHealth

# Lecturer: Gerardo Di Martino

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## Department of Electrical Engineering and Information Technology

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## CV: Gerardo Di Martino is tenure-track Assistant Professor of Electromagnetic Fields at the Department of Electrical Engineering and Information Technology of the University of Naples Federico II. His main research interests are in the field of remote sensing and electromagnetic propagation. He is Associate Editor of IEEE Access, Section Editorial Board Member of Remote Sensing (MDPI), and Topic Editor of Electronics (MDPI). He is a Senior Member of IEEE.

# Lecturer: Expert in telemedicine (TBC)

## Italian Health Department (TBC)

# Dates and Locations (rooms are in ed. 3/A, floor I, via Claudio 21, Napoli) (TBC)

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| --- | --- | --- | --- |
| Date | Hours | Room | Lecturer |
| 15 settembre 2020 | 10.30-12.30 | Softel/MS Teams | Gerardo Di Martino |
| 17 settembre 2020 | 10.30-12.30 | Softel/MS Teams | Gerardo Di Martino |
| 22 settembre 2020 | 10.30-12.30 | Softel/MS Teams | Gerardo Di Martino |
| 24 settembre 2020 | 10.30-12.30 | Softel/MS Teams | Gerardo Di Martino |
| 29 settembre 2020 | 10.30-12.30 | Softel/MS Teams | (TBC) |
| 1 ottobre 2020 | 10.30-12.30 | Softel/MS Teams | Gerardo Di Martino |

# Content

**I Lesson - Introduction**: Introduction to 5G; Mobile networks: the path towards 5G; What will 5G be?; Electromagnetic spectrum; millimiter waves; MIMO; beamforming; Internet of Things (IoT); Sensors Everywhere; Internet of Medical Things (IoMT); Introduction to Electromagnetic Fields (EMF); Maxwell equations and waves.

**II Lesson – 5G Electromagnetics**: EMF sources; Antennas; Antenna arrays; Millimeter waves; High-frequency limit and rays; Reflection, transmission, diffraction, diffusion; Power balance; Human exposure to EMF; Biological effects of EMF; Specific Absorption Rate (SAR).

**III lesson – Regulations and network planning**: Limits for the exposure to EMF: law regulations; 5G regulations and EMF measurements; EMF-aware network planning; Impact of law regulations on 5G network deployment; Ray tracing and ray launching; Ray-tracing software demonstration.

**IV Lesson – 5G applications in telemedicine and eHealth**: Telemedicine and eHealth: main applications; Digital hospital, digital homecare; Telesurgery: degree of telepresence; System requirements and telecommunication requirements; Triangle of 5G applications; Body Area Networks (BAN); Case studies.

**V Lesson – Telemedicine in Italy: Perspectives**: Telemedicine and eHealth: challenges and opportunities; Italian situation; Case studies. (TBC)

**VI Lesson - Conclusions**: Lessons learned; Telemedecine and eHealth: future ICT challenges; 5G and beyond; Open discussion; Final test.

# ECTS Credits: (0.2 per hour of lesson)

# Notes

Participants to the Module are requested to e-mail to prof. Name of the Professor the following: Student name, name of the PhD course and cycle.

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Info: **Prof. Gerardo Di Martino -** tel. 081 7683801 – gerardo.dimartino@unina.it