



UNIVERSITÀ DI PISA  
**DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE**  
**Dottorato di Ricerca in Ingegneria dell'Informazione**

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Doctoral Course

**“Computing in Communication Networks for 5G and the Tactile Internet”**

Prof. Dr. Dr. Frank H.P. Fitzek

*TU Dresden  
Centre for Tactile Internet  
Germany*

**Short Abstract:**

The course will advocate the need for computing in communication networks for upcoming 5G systems and the Tactile Internet. The course will start with the evolution of communication networks with special focus on 5G networks. Here some use cases are discussed and technical parameters derived. Later the Tactile Internet is introduced and elements from 5G are mapped to the setup of the Tactile Internet. As computing in the network will allow for new innovations such as machine learning, network coding, or compressed sensing, those technologies are shortly introduced. One huge part of the course will be hand on sessions for the students to implement the learned elements on their own computer using the ComNetsEmu (a tool that will be given to the students).

**Course Contents in brief:**

- 5G communication system
- Tactile Internet
- Software Defined Networks
- Network Function Virtualization
- Mobile Edge Cloud
- Network Slicing
- Network Coding
- Compressed Sensing
- Machine Learning

**Total # of hours of lecture:** To be defined

**References:**

[1] <https://git.comnets.net/public-repo/comnetsemu>

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## **CV of the Teacher**

Frank H. P. Fitzek is a Professor and head of the “Deutsche Telekom Chair of Communication Networks” at TU Dresden coordinating the 5G Lab Germany. He is the spokesman of the DFG Cluster of Excellence CeTI. He received his diploma (Dipl.-Ing.) degree in electrical engineering from the University of Technology – Rheinisch-Westfälische Technische Hochschule (RWTH) – Aachen, Germany, in 1997 and his Ph.D. (Dr.-Ing.) in Electrical Engineering from the Technical University Berlin, Germany in 2002 and became Adjunct Professor at the University of Ferrara, Italy in the same year. In 2003 he joined Aalborg University as Associate Professor and later became Professor. He co-founded several start-up companies starting with acticom GmbH in Berlin in 1999. He has visited various research institutes including Massachusetts Institute of Technology (MIT), VTT, and Arizona State University. In 2005 he won the YRP award for the work on MIMO MDC and received the Young Elite Researcher Award of Denmark. He was selected to receive the NOKIA Champion Award several times in a row from 2007 to 2011. In 2008 he was awarded the Nokia Achievement Award for his work on cooperative networks. In 2011 he received the SAPERE AUDE research grant from the Danish government and in 2012 he received the Vodafone Innovation prize. In 2015 he was awarded the honorary degree “Doctor Honoris Causa” from Budapest University of Technology and Economics (BUTE). His current research interests are in the areas of wireless and 5G communication networks, network coding, cloud computing, compressed sensing, cross layer as well as energy efficient protocol design and cooperative networking.

## **Room and Schedule**

Online

### **Schedule:**

Day1 - 11 May 2020, 9:00 - 13:00 - 5G and Tactile Internet

Day2 - 12 May 2020, 9:00 - 13:00 - Network Coding

Day3 - 13 May 2020, 9:00 - 13:00 - Hands On Session: ComNetsEmu

Day4 - 14 May 2020, 9:00 - 13:00 - Hands On Session: Examples / Exercises: Mininet, Docker, Network Slicing, Mobile Edge Cloud