



## **7. Topics and approximate lecture hours:**

- Cellular concepts and functions in mobile networks; standardization and evolution of mobile networks (2 lectures)
- 2G networks (GSM): services, radio interface, voice in GSM, radio resource management (with an emphasis on slow frequency hopping) (2 lectures)
- 2G networks: network and protocol architectures (2 lectures)
- 2G networks: security management (1 lecture)
- 2G networks: physical and logical channels (1 lecture)
- 2G networks: signaling procedures (1 lecture)
- GSM evolution to GPRS and EDGE (2 lectures)
- 3G (UMTS) networks: services and radio interface (2 lectures)
- 3G networks: network and protocol architectures (1 lecture)
- 3G networks: link adaptation and radio resource management (with an emphasis on capacity/coverage tradeoffs and cell breathing); simulation of uplink and downlink transmissions in UMTS (2 lectures)
- 3G networks: security management; physical, transport and logical channels (1 lecture)
- UMTS evolution to HSPA and HSPA+ (with an emphasis on opportunistic packet scheduling) (2 lectures)
- Activity on capture and radio quality analysis in mobile networks (1 lecture)
- LTE networks: services and radio interface (2 lectures)
- LTE networks: network and protocol architectures; voice in LTE (2 lectures)
- LTE networks: data flow management (1 lecture)
- LTE networks: link adaptation and radio resource management; security management; physical, transport and logical channels; LTE evolution to LTE-Advanced and LTE-Advanced Pro (1 lecture)
- Activity on analyzing and evaluating the performance of mobile networks (1 lecture)
- Recent advances in mobile networks: Self-Organizing Networks (SON), heterogeneous networks (HetNet), and Cloud radio access networks (C-RAN) (1 lecture)