

## Module I: Introduction to Cellular Technologies

2 kwietnia (czwartek)

Godz. 16:15 – 18:15

### Chapter 1: Introduction to GSM Technology

- Evolution of GSM
- GSM Functionalities
- Standards, frequency band
- GSM system concept (TDMA, FDMA)
- Network architecture
- GSM layer model

Godz. 18:20 – 20:20

### Chapter 1: Introduction to GSM Technology

- Interfaces and protocols of GSM system
- Transmission
- Channels multiplexing
- SS7 Signalling
- Concept of Intelligent Network
- Packet data transmission in GSM system

9 kwietnia (czwartek)

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### Chapter 2: Introduction to UMTS Technology

- Standards, frequency band
- Network architecture
- WCDMA concept (diversity, RAKE receiver ...)
- UMTS parameters (carrier spacing, spreading factor ...)
- Spreading and Modulation (scrambling codes, channelization codes)
- Differences between GSM and UMTS systems

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### Chapter 2: Introduction to UMTS Technology

- Radio interface/ Iu, Iub and Iur protocols
- UMTS channels (logical, transport and physical channels), frame structure (Uu, Iub)
- IDLE mode and CONNECTED mode (CELL\_DCH, CELL\_FACH, CELL\_PCH, URA\_PCH)

16 kwietnia (czwartek)

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### Chapter 3: Procedures in UMTS

- IDLE mode procedures
  - PLMN selection
  - Cell search
  - Cell (re-)selection
  - System information (SIB's)

- RACH
- Location Registration
- Paging
- CONNECTED mode
  - RRC connection establishment
  - RAB establishment and reconfiguration
  - Measurements

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### Chapter 3: Procedures in UMTS

- Radio Resource Management (RRM)
  - Power Control
  - Handover Control
  - Admission Control
  - Load Control
- Demonstrations
  - Nemo Analyze/Outdoor – radio network analysis tool
  - eEPOS – radio network planning tool
  - Excel – practical calculation tasks

23 kwietnia (czwartek)

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### Chapter 4: Packet data transmission in UMTS, HSPA technology

- Introduction to packet data transmission in UMTS
- Transport channels for packet data
- HSPA technology
  - Modulation
  - Retransmission HARQ
  - Link Adaptation process
  - Packet Scheduling algorithms

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### Chapter 5: Laboratory: UMTS procedures messages analysis

- Demonstrations
  - Nemo Analyze/Outdoor – radio network analysis tool