

Title Wireless System Design	Code POZ04WTS2ICE26
Field Electronics and Telecommunications	Year / Semester 2 /autumn
Specialty Information and Communication Technologies	Course elective
Hours Lectures: 2 Classes: Laboratory: 2 Projects / seminars:	Number of credits 5

Lecturer:

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Status of the course in the study program:

Elective course for students of Electronics and Telecommunications, specialization Information and Communication Technologies.

Objectives of the course:

To provide students with the knowledge of radio network planning with the application to cellular systems.

Course description:

Lectures: UMTS system architecture basics: UMTS Radio Access Network (UTRAN), WCDMA air interface, radio protocols architecture, NAS architecture.
Radio Network Planning: planning process phases, parameters that require planning.
Propagation modeling: radio propagation, channel models in picocells, channel models in microcells, channel models in macrocells, interference modelling
Antenna Modelling. Link Level Model. CDMA Capacity Considerations.
Static system level model. Link level aspects. Dynamic system level model.
Phases of RAN design process. Input parameters for RAN design. Network dimensioning.
Detailed network planning: site-to-site distance, antenna height, site location, sectorization, sector and antenna direction, antenna tilt, hierarchical cell structure.
Compatibility of UMTS System: spectrum management, compatibility calculations, intra-system compatibility, inter-system compatibility, international cross-border coordination.
Optimisation of UMTS radio network: benchmarking optimisation results, selection of optimised network parameters, optimisation targets, automation of radio network planning.
GSM network planning process: network dimensioning – coverage, network dimensioning – capacity, network planning – frequency assignment.

Project classes: Planning radio access network for cellular systems using software tools – coverage and capacity considerations.

Initial knowledge:

Basic knowledge of wireless/cellular systems and spread spectrum systems.

Teaching methods:

Lectures supported by multimedia presentations.

Assessment methods:

Individual projects, written exam.

Bibliography:

1. M. J. Nawrocki, M. Dochler, A. H. Aghvami, Understanding UMTS Radio Network, Wiley, 2006
2. A. R. Mishra, Advanced Cellular Network Planning and Optimisation, Wiley, 2007
3. J. Laiho, A. Wacker, T. Novosad, Radio Network Planning and Optimisation for UMTS, Wiley, 2002
4. M. Tolstrup, Indoor Radio Planning, Wiley, 2008