ELEC 4007 WIRELESS COMMUNICATIONS

Credit Points 10

Legacy Code 300065

Coordinator Ranjith Liyanapathirana (https://directory.westernsydney.edu.au/search/name/Ranjith Liyanapathirana/)

Description The subject covers the analysis, design and operation of modern wireless communication systems. The primary focus is on the physical layer and hardware, emphasizing the fundamentals of coding and modulation, spread spectrum and multiple access techniques. Current wireless architectures and mobile communication systems are also covered.

School Eng, Design & Built Env

Discipline Communications Technologies

Student Contribution Band HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 4 subject

Pre-requisite(s) ELEC 3001 OR
ELEC 3002

Equivalent Subjects LGYA 5692 - Digital Communication Engineering

Assumed Knowledge

Students should have a good understanding of signals and systems, probability and random processes and fundamentals of communication systems.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe and analyse current wireless communication systems including GSM, CDMA, PCS, W-LAN. Wi-Fi, Bluetooth, 3G and 4G mobile systems.
2. Describe and analyse coding and modulation techniques used in wireless communication systems.
3. Analyse bit error rates, receiver structures (correlation and matched filter), spectral occupancy and antenna diversity.
4. Explain the physical properties of the radio channel.
5. Describe basic forms of multiple access techniques applied to wireless communication.
6. Calculate a free-space link budget and a terrestrial link budget.
7. Determine bit error probabilities and coding gains of coding and modulation techniques used in wireless communication.
8. Design wireless communication systems

Subject Content

Evolution of mobile radio communication
The cellular system; design fundamentals
Frequency reuse, channel assignment strategies, handoff
Interference and system capacity
Mobile radio propagation; multipath fading, Rayleigh and Ricean distributions
Signal Space Design techniques
Matched Filter and Correlation Receiver
Coding and Modulation techniques for wireless communication, Spread Spectrum Modulation
Equalization, diversity and channel coding
Multiple access techniques (FDMA, TDMA, CDMA, OFDM)
Novel wireless architectures, wireless systems and standards (WCDMA)

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Intra-session Exam	1 hour, closed book, individual	20	N	Individual
Practical	5 x 3 hrs individual, practical assignments	20	Y	Individual
Final Exam	3 hours individual, closed book	60	Y	Individual

Teaching Periods

Autumn (2024)

Penrith (Kingswood)

On-site

Subject Contact Ranjith Liyanapathirana (https://directory.westernsydney.edu.au/search/name/Ranjith Liyanapathirana/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC4007_24-AUT_KW_1#subjects)