



UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
School of Electrical and Information Engineering

**ELEN7064 – PRINCIPLE OF WIRELESS COMMUNICATION/LONG
TERM EVOLUTION**

COURSE BRIEF AND OUTLINE: 2018

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1. Course Background and Purpose

The main focus of this course is on the design, analysis and fundamental limits of wireless transmission systems. In particular, we look at the wireless channel and system models, fading and diversity, resource management and power control, multiple antenna and Multiple Input multiple Output (MIMO) systems, space-time codes and decoding algorithms, multiple-access techniques and multiuser detection, cellular and ad-hoc network topologies, Orthogonal Frequency Division Multiplexing (OFDM) and ultrawideband systems, and architectural issue. These will be considered in the context of the Long Term Evolution (LTE) Wireless Communication Systems.

2. Course Outcomes

On completion of the course the student should be able to:

- apply a systems approach to engineering problems
- investigate new and emerging technologies
- analyse key trade-offs in the design of communication systems
- present a coherent report on a topic that is initially unfamiliar

3. Course Content

The course content in 2018 will cover the following topics.

- Background of Long Term Evolution (LTE)
- Objectives of LTE
- Physical Layer of LTE:
 - Up Link: SC-FDMA; Down Link: OFDM/OFDMA
 - Antenna System
 - Radio Interface Channels

- Layer 2
- Core network
- Voice over LTE
- LTE and WiMAX
- Heterogeneous Networks

4. Prior Knowledge Assumed

The student will normally have completed some courses in the MEng or MSc(Eng) programme, and as a minimum the module “Principles of Communications Systems”.

5. Textbook

- i. Erik Dahlman, Stefan Parkvall, and Johan Sköld “4G, LTE/LTE-Advanced for Mobile Broadband”, Academic Press, 2011.
- ii. Stefania Sesia, Issam Toufik and Matthew Baker “LTE, The UMTS Long Term Evolution: From Theory to Practice,” Wiley- Blackwell; 2nd Edition , 22 July 2011.

6. Assessment

Assessment and Examination

The mark for this course will be made up of two components:

- A 3 hours written examination: on **Tuesday 29th May 2018 between 11:00-14:00 at CM3**. This examination will count for **60%** of the overall course mark.
- Specific topic from the course content will be given to each student for presentation from the 2nd week of the commencement of lecture. The marks for this presentation will count for **10%** of the overall course mark
- An assignment/project which is to be performed in groups of 2 or 3 students will be executed by the students. The marks for this assignment/project will count for **30% (10% for group presentation, 20% for group report)** of the overall course mark.
 - All reports’ submissions must be in strict accordance with the guidelines contained in the Blue Book and the rules contained in the Red Book. No exceptions will be considered.
 - **Submission date** (Soft via email and Hard Copies at the EIE reception): **on or before 12:00 noon , 11th June 2018**

7. Information to Support the Course

7.1 Course Home Page

Further information and announcements regarding the course might be posted on the course home page on Sakai. All students are expected to consult the course home page at regular intervals.