

# **TDC 512**

## **Cellular and Wireless Telecommunications**

### **Syllabus**

#### **Basic Information**

Meeting time: Monday 5:45PM - 9:00PM in LEWIS 01514

Instructor: Dr. Filipo Sharevski [fsharevs@cdm.depaul.edu](mailto:fsharevs@cdm.depaul.edu)

Office: CDM 750, Phone: 312-362-1075; Hours: Mon/Wed 2:30PM - 5:00PM

#### **Course Description**

An introductory course in cellular and wireless communications with an emphasis in 4G Long Term Evolution (LTE) and LTE-Advanced cellular networks. Topics include principles of digital wireless communications, cellular architecture, radio access deployment, core network deployment, subscriber management, mobility and session management, security, roaming, interconnection, Self-Optimizing Networks (SON), Voice over LTE (VoLTE), and LTE-Advanced upgrades. Student lab assignments may use LTE network equipment deployed in the School of Computing De-Mobile Lab. PREREQUISITE(S): TDC 464

#### **Agenda**

<b>W</b>	<b>Topic</b>	<b>Homework/Lab</b>
1	<b>Principles of Wireless Communications</b>	Homework 1
2	<b>LTE Network Architecture and Air Interface</b>	Homework 2
3	<b>Data Transmission and Reception</b>	Homework 3
4	<b>Network Registration and Deregistration</b>	Lab 1
5	<b>Evolved Packet Core</b>	Lab 2; Project Topics
6	<b>LTE Security</b>	Lab 3
7	<b>Voice/SMS Delivery in LTE</b>	Lab 4
8	<b>LTE-Advanced</b>	Project Outline
9	<b>LTE /LTE-A Planning and Optimization</b>	Project Update
10	<b>Project Presentations</b>	

#### **Textbooks**

*"An Introduction to LTE: LTE, LTE-Advanced, SAE, VoLTE and 4G Mobile Communications"*, 2nd Edition – Cristopher Cox, Wiley, ISBN: 9781118818015

*"LTE Small Cell Optimization - 3GPP Evolution to Release 13"* - Harri Holma, Jussi Reunanen, Antti Toskala, Wiley, ISBN: 9781118912577

“4G, LTE-Advanced Pro and The Road to 5G” - Erik Dahlman, Johan Skold, and Stefan Parkvall Academic Press, ISBN: 9780128046111 (optional)

## Grading

Grading is based on a percentage basis, which is then convert to a letter as:

Percentage Grade	Letter Grade	Manner of fulfillment
92-100	A	Excellent
90-91	A-	
88-89	B+	
82-87	B	Very Good
80-81	B-	
78-79	C+	
72-77	C	Satisfactory
70-71	C-	
68-69	D+	
62-67	D	Poor
60-61	D-	
0-59	F	

The weights of each assignment for contributing to the final average are as follows:

Assignment	Weight in final grade
Homework	18%
Labs	32%
Project/Presentation	50%

## Assignments Delivery

Homeworks/Labs are due a week after each is assigned at 11:59 PM.

## Homework

On weeks when there is a **small research** assigned, you need to do an online research and provide a brief summary of the topic assigned. Example, write an overview of the cellular networks from the first to the latest generation. You need to write about the major features, performance, and the needs for every next generation, plus include interesting details, issues, security challenges, etc.

On weeks when there is a **problem** assigned, you need to provide the step-by-step solution to the problem. Example, calculate the total bandwidth for a given configuration of the LTE resource grid in downlink. Submit not just the numbers, but also what is your rationale for the calculation in every step.

On weeks where there is an **article** assigned, you need to critically review it. What's an article? A journal/conference paper. What's critical review? It's not summarizing the article as in "Authors said...". Instead, you need to analyze the content of the article in the context of the lectures, labs, and recent news/reports and provide your opinion on it.

## Labs

You have to work with and/or create LTE/LTE-Advanced packet captures, analyze them, and provide your observations.

## Class Participation

In every class, we will discuss a lot of issues, challenges and interesting anecdotes about cellular networks. I expect your active participation with your opinions.

## Project/Presentation

Mid quarter, you have to pick a practical LTE problem to work in your final project. This is your main class assignment and shall result into a final report. In the week of finals, you will present your problem solution/research findings (abridged version of the report) to the entire class.

## Other Important Information

- Attendance: I expect you will attend every class.
- Class Cancellation: Unless DePaul closes because of weather, we will have class.
- Academic Integrity: I expect that you have read and understood DePaul's Academic Integrity policy: <http://academicintegrity.depaul.edu/>.
- Changes to Syllabus: I reserve the right to change the syllabus and you will be timely informed of such changes. I don't expect significant deviations of the course agenda.
- Academic Policies: <http://www.cdm.depaul.edu/Current%20Students/Pages/PoliciesandProcedures.aspx>
- Students with disabilities: Contact the instructor or the Center for Students with Disabilities (CSD) at: [csd@depaul.edu](mailto:csd@depaul.edu) prior to the class start.
- Online Teaching Evaluation (OTE): Please evaluate the course in CampusConnect when you receive a notification towards the end of the quarter.