

TDC 371 - Wireless Communication Networks

Meeting time: Online. Covid-19 University Direction

Instructor: Dr. Filippo Sharevski fsharevs@cdm.depaul.edu

Office Hours: Tuesday, 1:30 to 4:30. Email me; or message on <https://discord.gg/jaVmBqf>.

Course Description and Agenda

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), LTE-Advanced, and 5G wireless access. Student lab assignments may use LTE network equipment deployed in the School of Computing De-Mobile Lab. PREREQ: IT263 OR TDC 261.

W	Topic	HW/Lab	Reading (optional)
1	Principles of Wireless Communications	HW 1	Intro to LTE – Ch 3, 4
2	LTE Network Architecture and Air Interface	HW 2	Intro to LTE – Ch 1, 2, 6
3	Data Transmission and Reception	HW 3	Intro to LTE – Ch 8, 9, 10
4	Network Registration and Deregistration	Lab 1	Intro to LTE – Ch 7, 11
5	Evolved Packet Core	Lab 2	Intro to LTE – Ch 13, 14
6	LTE Security	Lab 3	Intro to LTE – Ch 12, https://alter-attack.net
7	Voice/SMS Delivery in LTE (Projects)	Lab 4	Intro to LTE – Ch 16
8	LTE Advanced – CoMP, Cellular IoT, LAA	HW 4	From LTE to 5G for Connected Mobility (review)
9	5G Wireless Access	HW 5	Bringing 5G into Rural and Low-Income Areas: Is It Feasible?
10	Project Presentations		

Textbooks (Recommended)

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

Grading

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

Percentage	Grade	Percentage	Grade	Percentage	Grade
		100-92	A	91-90	A-
89-98	B+	87-82	B	81-80	B-
79-78	C+	77-72	C	71-70	C-
69-68	D+	67-62	D	61-60	D-
59-0	F				

Assignments

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

Assignment	Weight in final grade
Homework	30%
Labs	20%
Project	40%
Presentation	10%

Homeworks/Labs are due a week after each is assigned at 11:59 PM. No late assignments will be accepted. Absolutely NO grade bargaining will be allowed.

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 new 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 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 will work with LTE packet captures - analyze them and provide your observations about the network interactions presented in a given packet capture.

Class Participation

The participation will take place on the following discord forum: <https://discord.gg/jaVmBqf>.

Project

You will have to plan a real-world deployment of a LTE/LTE-Advanced network. This is your main class assignment and shall result into a final report. In the week of finals, you will present your LTE/LTE-A network deployment plan (abridged version of the report) to the entire class. All the tools, demos, manuals, and guidelines are already included in D2L.

Presentation

You will do a PowerPoint presentation. Record your voice. Submit it into the respective folder. No more than 5 slides. The gist of your paper. Extra content or extra slides will be penalized. Its

simpler than you think it is. I need to hear your network deployment solution. Briefly and precisely to the point.

Class Pragmatics

If you somehow contemplate the thought: “Jeez, this is hard...I will email the professor, at least I won’t make a mistake...” DO NOT email me. It’s hard on purpose. Make mistakes. Learn from them. Communicate the problem on the class discussion forum, some of the colleagues might have already figure it out. Share your knowledge and experience with the problem. If in doubt or have a dilemma about multiple ways of approaching the problem, ALWAYS choose the hardest one. Again, DO NOT email me.

Email me only if you notice an obvious problem, hurdle, or if something doesn’t work for the ENTIRE class. The course is designed for you to pick up practical skills in analysis of wireless traffic. You might have been complacent and thought “This class must be same as with other TDC classes... TCP/IP and all that.” Well, it is not. You will have to learn and use Wireshark to analyze traffic and protocols beyond the TCP/IP stack. Don’t forget, this is a NETWORKING class. Network engineering is a personal endeavor and success is only achieved with perseverance and curiosity in learning protocols and way to make networks solve real world problems. My job is to reinforce this type of learning. You will thank me later after you graduate and get a fancy network engineering gig.

Other Important Information

- Attendance: I expect you will attend every class (or watch all the lectures).
- 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 prior to the class start.
- Preferred Name & Gender Pronouns: I will gladly honor your request to address you by an alternate name or gender pronoun: <http://policies.depaul.edu/policy/policy.aspx?pid=332>
- Online Teaching Evaluation (OTE): Please evaluate the course in CampusConnect when you receive a notification towards the end of the quarter.