**CSCE 4520/5520: Wireless Networks and Protocols**

**Fall/2025:**

**Section: 5520.002 & 4520.001**

**Modality: Face-to-face**

**Meeting Time/Place: Tue & Thu, 11:30 AM – 12:50 PM, NTDP B155**

I reserve the right to modify course policies, the course calendar, assignment or project point values, and due dates.

# Instructor Information

**Instructor: Dr. Chenxi Qiu**

Office: NTDP F228, Email: chenxi.qiu@unt.edu

Office Hours (in person): Tue 9:30–11:30 AM, Thu 9:30–11:30 AM (and by appointment)

**Teaching Assistant: Gaoyi Chen**

Office: NTDP F257, Email: gaoyichen@my.unt.edu

Office Hours (in person): Tue 9:30 AM – 11:30 AM, Thu 3:00 PM – 5:00 PM (and by appointment)

# In addition to in-person meetings, students may contact the instructor and TA via Canvas; messages from non-UNT email accounts or social media will not be accepted.

# Course Description, Structure, and Objectives

**Catalog Description.** Architecture and elements of a wireless network. Use and process of mobility management. Signaling schemes used in wireless networks; network signaling, protocols and standards (GSM, IS‑95, WAP, MobileIP, CDMA2000, 4G/LTE). Analyze the operation and performance of wireless protocols. Interworking of wireless and wireline networks.

Credits: **3 semester credit hours; 3 lecture hours**

Prerequisite: CSCE 3600

Course Coordinator: Amir Mirzaeinia

Course Structure. Two 80‑minute meetings weekly; lecture with in‑class activities, problem discussions, and occasional short quizzes. Materials and announcements will be posted on Canvas.

## Learning Outcomes (upon successful completion)

* Explain basic operation of a cellular network.
* Describe the roles and basic operation of core elements in a cellular network.
* Compare soft vs. hard handoff mechanisms.
* Explain the functions of interfaces between BTS, BSC, MSC, and PSTN.
* Discuss fundamental QoS issues for voice and data services in cellular networks.
* Summarize the basic operation of 4G/LTE and interworking of wireless and wireline networks.

## Relationship to ABET Student Outcomes (selected)

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| Course Outcome | Student Outcomes |
| 1,2 | 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics |
| 3, 4, 5 | 1. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors |
| 3, 4, 5 | 1. an ability to communicate effectively with a range of audiences |
| 3, 4 | 1. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
| 2, | 1. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives |
| 1, 3 | 1. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |
| 5 | 1. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. |

# Required/Recommended Materials

Textbook: No text required.

Recommended references (optional):

* A. Goldsmith, Wireless Communications.
* T. Rappaport, Wireless Communications: Principles and Practice.
* Selected 3GPP/IEEE standards (excerpts provided on Canvas).

Technology Requirements: Canvas access and ability to submit PDFs of assignments.

This course has digital components. To fully participate in this class, students will need internet access to reference content on the Canvas Learning Management System. If circumstances change, you will be informed of other technical needs to access course content.  Information on how to be successful in a digital learning environment can be found at [Learn Anywhere](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fonline.unt.edu%2Flearn&data=05%7C02%7CChenxi.Qiu%40unt.edu%7Cdd4e7bb3493646e4df2808ddde7d53ac%7C70de199207c6480fa318a1afcba03983%7C0%7C0%7C638911352037137323%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=sJyzXQyACWxJgM8Q97P5SMJYLYncELYkFnDRvMNNdg8%3D&reserved=0) ([https://online.unt.edu/learn](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fonline.unt.edu%2Flearn&data=05%7C02%7CChenxi.Qiu%40unt.edu%7Cdd4e7bb3493646e4df2808ddde7d53ac%7C70de199207c6480fa318a1afcba03983%7C0%7C0%7C638911352037151489%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=i1gim1a8zRrXGXA5JevGmDZ9KBGhHODVCmQG3Xsu0K4%3D&reserved=0)).

# Topics (tentative)

* Overview of wireless network operation and architectures
* Cellular generations: 2G, 2.5G, 3G, 4G/LTE (intro to 5G concepts)
* GSM/CDMA fundamentals; SS7 transport protocols
* MS–BTS/BSC interfaces and protocol layers (A1–A12)
* Connection management and mobility (handoff, mobility management)
* BSC–BSC interface; radio resource management
* MSC–MSC interfaces and protocols
* Data over wireless networks; Mobile IP; 4G packet core
* Wi‑Fi protocols and interworking with cellular
* Contemporary topics and student seminar presentations (time permitting)

# Course Requirements & Grading

**Assessment Breakdown**

* Assignments: 27%
* Midterm Exam: 40%
* Final Exam: 30%
* Attendance: 3%

**Grading Scale**

* A: 90–100% — Outstanding, excellent work
* B: 80–89% — Good, above minimum criteria
* C: 70–79% — Solid, meets criteria
* D: 60–69% — Below minimum criteria
* F: <60% — Fails to complete requirements

Late Work Policy: A 10% per day penalty applies to late assignments unless arranged in advance or covered by a university‑excused absence with documentation.

Use of Generative AI (GenAI): Limited, with attribution and only when permitted on an assignment. Submitting AI‑generated work as your own or using GenAI when prohibited violates the Student Academic Integrity policy.

# Schedule & Key Dates (subject to change)

A detailed weekly schedule and due dates will be posted on Canvas.

Final exam is schedule on Tuesday, December 9th, 2025. Final Exam details will be announced when posted by the Registrar. Changes due to closures will be communicated via Eagle Alert and Canvas.

# Attendance & Participation

Regular attendance and participation are expected. For absences due to illness, emergency, military service, religious holy days, or official university functions, notify the instructor as early as possible and follow university policy.

# Academic Integrity

All students must uphold the UNT Student Academic Integrity Policy (06.003). Work submitted must be your own and created for this course. Unauthorized collaboration, plagiarism, or use of prohibited resources will be addressed per university procedures.

# Accessibility (ODA)

To request accommodations, register with the Office of Disability Access (ODA) each semester and obtain your letter of accommodation. Discuss your accommodations with the instructor to ensure timely implementation.

# Student Support Services & Policies

UNT provides academic success, mental health, and wellness resources. See the consolidated Student Support Services & Policies page linked on Canvas for details.

# Professional Conduct & Inclusive Learning

We value mutual respect and inclusive participation. Disagreement is welcome; personal attacks are not. If you experience barriers to participation, please contact the instructor.

# Eagle alert notice

Students will be notified by Eagle Alert if there is a campus closing that will impact a class and our calendar is subject to change. [Campus Closures Policy](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fpolicy.unt.edu%2Fpolicy%2F15-006&data=05%7C02%7CChenxi.Qiu%40unt.edu%7Cdd4e7bb3493646e4df2808ddde7d53ac%7C70de199207c6480fa318a1afcba03983%7C0%7C0%7C638911352037165756%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=UNmSnSwIVwGN4aGeeI9PM2UUMKC8vfjBHmyEFeju3DY%3D&reserved=0) ([https://policy.unt.edu/policy/15-006](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fpolicy.unt.edu%2Fpolicy%2F15-006&data=05%7C02%7CChenxi.Qiu%40unt.edu%7Cdd4e7bb3493646e4df2808ddde7d53ac%7C70de199207c6480fa318a1afcba03983%7C0%7C0%7C638911352037179626%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=ut92N%2BxKXkMqNil6GthqAip5SZYbOv%2FzP8Twjhzj2GE%3D&reserved=0)).

# Final Notes

* This syllabus may be updated; changes will be announced in class and on Canvas.
* For emergencies and campus closures, monitor Eagle Alert and Canvas announcements.
* Questions are welcome—use office hours and Canvas discussion forums to stay engaged.