Communication System Performance

EE 643

Instructor Info ⎯

👤 Yuanzhang Xiao

🕐 Office Hours: after class or by appointment

📍 POST 201G or online

ℹ️ https://hawaii.zoom.us/j/7317206772

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Course Info ⎯⎯

📅 MW

🕐 2:00pm–3:15pm

📍 KUY 208

Overview

Wireless communication is a critical infrastructure of our modern society and an enabling technology for many other critical infrastructures (e.g., sensing, monitoring, and control in smart grids, industrial applications, transportation, etc.). In this class, we will learn the basics of wireless communication systems, exciting new topics such as the integration of artificial intelligence (AI) and wireless communications, emerging paradigms of communication systems such as quantum communication.

Specifically, the topics include but are not limited to

- foundations
  - wireless channel models
  - capacity of wireless communication networks
  - multiple-input multiple-output (MIMO)
  - multiple access and resource management
- integration of AI and wireless communications
  - wireless communication for federated learning
  - reinforcement learning applied to wireless communication
  - generative AI applied to wireless communication
  - large language models (LLMs) for wireless networks
- emerging paradigms of wireless communication
  - quantum communication
  - space-air-ground integrated networks
  - digital twins

At the end of this course, the students will have solid understandings of the rigorous theoretical foundation, and keep up to date with the latest trends of wireless communication research.

Material

- *Fundamentals of Wireless Communication* by David Tse and Pramod Viswanath
- a reading list of papers discussing the state-of-the-art

Grading Scheme

60%	3 Homework, 20% each
40%	Course Project (literature review and presentation)