

EE 311 Signals and Linear Systems

Fall, 2020

CRAMER 101

MWF, 9:50 – 10:40

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Office Hours: MW 2:00 – 4:30 or by appointment

Course Description:

Signals and Linear Systems, 3 cr, 3 cl hrs

Normally offered fall semester Fundamentals of continuous and discrete signals and systems. Topics include: linear time-invariant systems, convolution, Fourier series, Fourier transforms, Laplace transforms, z-transforms, sampling theory, transfer functions, poles and zeros, feedback systems, filters, convolution, application of MATLAB, and related topics.

Mode of Instruction: face-to-face.

Pre-requisites: EE 212, EE 271, and MATH 335

Place in Curriculum: It's a required course for EE majors

Course Learning Outcomes: The objectives of the linear systems sequence are for the student to be able to analyze linear time-invariant continuous-time and discrete-time systems, and to design simple systems. EE 341 covers time-domain and frequency-domain representations of signals, and time-domain, frequency-domain representations, and transfer function representation of linear systems.

To accomplish this, the student will be able to:

- Describe the basics of linear time-invariant systems and systems.
- Determine whether a system is linear, time-invariant, and causal.
- Represent continuous-time linear systems by differential equations, and discrete-time linear systems by difference equations.
- Find the output of a simple linear system by solving its differential or difference equation.
- Find the output of a simple linear system through convolution techniques.
- Determine the frequency components of signals using the Fourier transform.
- Determine the responses of linear systems to simple inputs using Fourier transform techniques.
- Use the discrete Fourier transform (DFT) to approximate the discrete-time Fourier transform (DTFT) of discrete-time signals.

- Determine the responses of continuous time linear systems to simple inputs using Laplace transform techniques.
- Determine the responses of discrete time linear systems to simple inputs using z-transform techniques.
- Use MATLAB to plot signals.
- Use MATLAB to generate computer implementations of the techniques for analysis and design of linear systems discussed in this course.

Course Requirements:

Text:

Title: **SIGNALS & SYSTEMS:**

THEORY AND APPLICATIONS

PDF: free download umich.edu/publications/ee/

Authors: Fawwaz T. Ulaby and Andrew E. Yagle

Publisher: Michigan Publishing, 2018

- **Homework** will be assigned once per week. There will be a short quiz every other Friday. There will be two or three partial exams and a final.
- **Grade distribution** proposed is as follows:

Homework: 20%

Quizzes: 10%

Mid-term exams: 40%

Final exam: 30%

Academic Honesty: New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the student handbook, which can be found at: <http://www.nmt.edu/student-handbook>. You are responsible for knowing, understanding, and following this policy.

Reasonable Accommodations:

New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. To schedule an appointment, please call 835-6619.

Counseling Services:

New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. These confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

Respect Statement: New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: “New Mexico Tech’s primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community.”

COVID-19 Safety Issues for Face-to-Face Instruction: Students must follow campus-wide safety protocols, including mandatory use of face coverings and maintaining a minimum of 6 ft social distance from other students and faculty. Students should not enter the classroom earlier than 10 minutes prior to start of class, and should exit the classroom within 10 minutes of the end of class. Students who fail to comply are subject to disciplinary procedures. [*Only needed for F2F classes.*]

Title IX Reporting:

Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the University’s mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered “Responsible Employees” and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech’s Title IX Coordinator (Dr. Peter Phaiyah, 20D Brown Hall, 575-835-5187, titleixcoordinator@nmt.edu). Please visit Tech’s Title IX Website (www.nmt.edu/titleix) for additional information and resources.