

## ECGR 3111: Signals and Systems

Instructor: Prof. Ahmed Arafa, Spring 2023

- Class: MW 4:00–5:15 pm (EPIC G222)
- Office hours: TR 1:00 – 2:00 pm (EPIC 2262)
- TA: Md. Nurul Absar Siddiky
  - Office hours: MW 2:30 – 3:30 pm (EPIC 2342)
- Recitation: F 4:00 – 5:15 pm (EPIC G222)
- Topics:
  1. Introduction: continuous-time and discrete-time signals; basic operations on signals; complex exponentials and sinusoidal signals; unit impulse and unit step functions; system properties
  2. Linear Time Invariant (LTI) Systems: impulse response; discrete-time LTI systems (the convolutional sum); continuous-time LTI systems (the convolutional integral); LTI system properties; description of causal LTI systems by differential and difference equations.
  3. Fourier Series (FS) Representation of Periodic Signals: convergence and properties; FS and LTI systems
  4. Fourier Transform (FT): Development of the FT representation of aperiodic signals; convergence, properties, and applications of FT; continuous-time Fourier transform (CTFT) and LTI systems
  5. Laplace Transform: region of convergence; inverse Laplace transform; properties; analysis and characterization of LTI systems using Laplace transform
  6. Discrete Time Fourier Transform (DTFT): Development of the DTFT for aperiodic discrete-time signals; properties, and applications in LTI systems; the discrete Fourier transform (DFT) and the fast Fourier transform (FFT)
  7. Z-Transform: region of convergence; inverse Z-transform; properties; analysis and characterization of LTI systems using Z-transform
- Readings:

Posted lecture notes + your own notes should be sufficient for the theoretical understanding of the material. In addition, the following reference is required:  
A. V. Oppenheim, A. S. Willsky, S. H. Nawab, *Signals and Systems*, 2nd edition, Prentice Hall 1997.

- Grading:
  1. Homework: 20%
  2. Quizzes: 20%
  3. Midterms: 30%
  4. Final: 30%
- Often, *challenge* questions would be assigned in-class, whose solution is to be submitted at a specific due date, for *bonus* marks.
- Academic Integrity:

Students have the responsibility to know and observe the requirements of the [UNCC Code of Student Academic Integrity \(2001-2003 UNCC Catalog, p. 275\)](#). This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.
- University Policy 409: Religious Accommodations for Students:

The University maintains a [list of religious and cultural holidays](#) that have particular significance to some traditions represented on campus. More on this regard can be found in the following link: <https://legal.uncc.edu/policies/up-409>.