

# ECE 457: Fourier Optics

IN

## Linear Systems Analysis

- Understand Fourier transform

## Principles of Wave Optics

- Understand plane wave propagation
- Understand interference
- Understand basic concepts of wave diffraction

## MATLAB Simulation

- Use basic MATLAB coding

## Pre-requisites

- ECE 311 with a C or higher; ECE342 with a C or higher

## Concepts:

- Fourier transforms in optical systems
- Angular (wavenumber) Spectrum analysis of optical systems and propagation
- Scalar diffraction theory
- Optical Coherence
- Light Scattering
- Noise and Radiance
- Speckle
- Multidimensional Fourier transforms

## Applications:

- MATLAB simulation of propagation in optical systems
- Application of Fourier and linear systems to optical systems
- Gain intuitive understanding of optics and propagation
- Coherent and incoherent imaging systems

## Tools:

- Complex MATLAB Coding

OUT

## Optical Systems Computation

- Compute diffraction of optical fields numerically and analyze with Fresnel and Fraunoffer propagation
- Calculate imaging transfer functions for coherent and incoherent imaging system

## Optical Systems Analysis

- Analyze and design optical Fourier processing systems

## Optical Systems Design

- Design and numerically simulate a full complex optical system