

CHAPTER OVERVIEW

Module 4 - Fourier Optics

The *Fourier Optics* module focuses on applying Fourier analysis to understand and design optical systems. Students will learn to describe optical signals as superpositions of tilted plane waves and define linear and shift-invariant (LSI) optical systems. The module emphasizes identifying criteria for determining if an optical system is LSI and exploring the mathematical implications. Key concepts include expressing the output of LSI systems as convolutions of input signals with impulse responses, facilitating system analysis. We will estimate the complex amplitude distribution in free propagation under Fresnel and Fraunhofer regimes. Additionally, students will explore image processing in the Fourier domain, gaining skills to analyze, filter, and manipulate images. This module bridges optics, mathematics, and image processing techniques.

This Module has 4 classes.

[Class 13 - Space vs Fourier Domain, Principle of Fourier Optics, LSI systems](#)

[Class 14 - Impulse response and Transfer Function in free propagation](#)

[Class 15 - Fresnel and Fraunhofer diffraction patterns](#)

[Class 16 - Lenses, Optical Fourier Transforms, 4F imaging systems and spatial filtering](#)

[Module 4 - Summary](#)

[Multi-choice questions](#)

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